No. 2055 Vol. LIII

MAY 13th, 1948

Aero

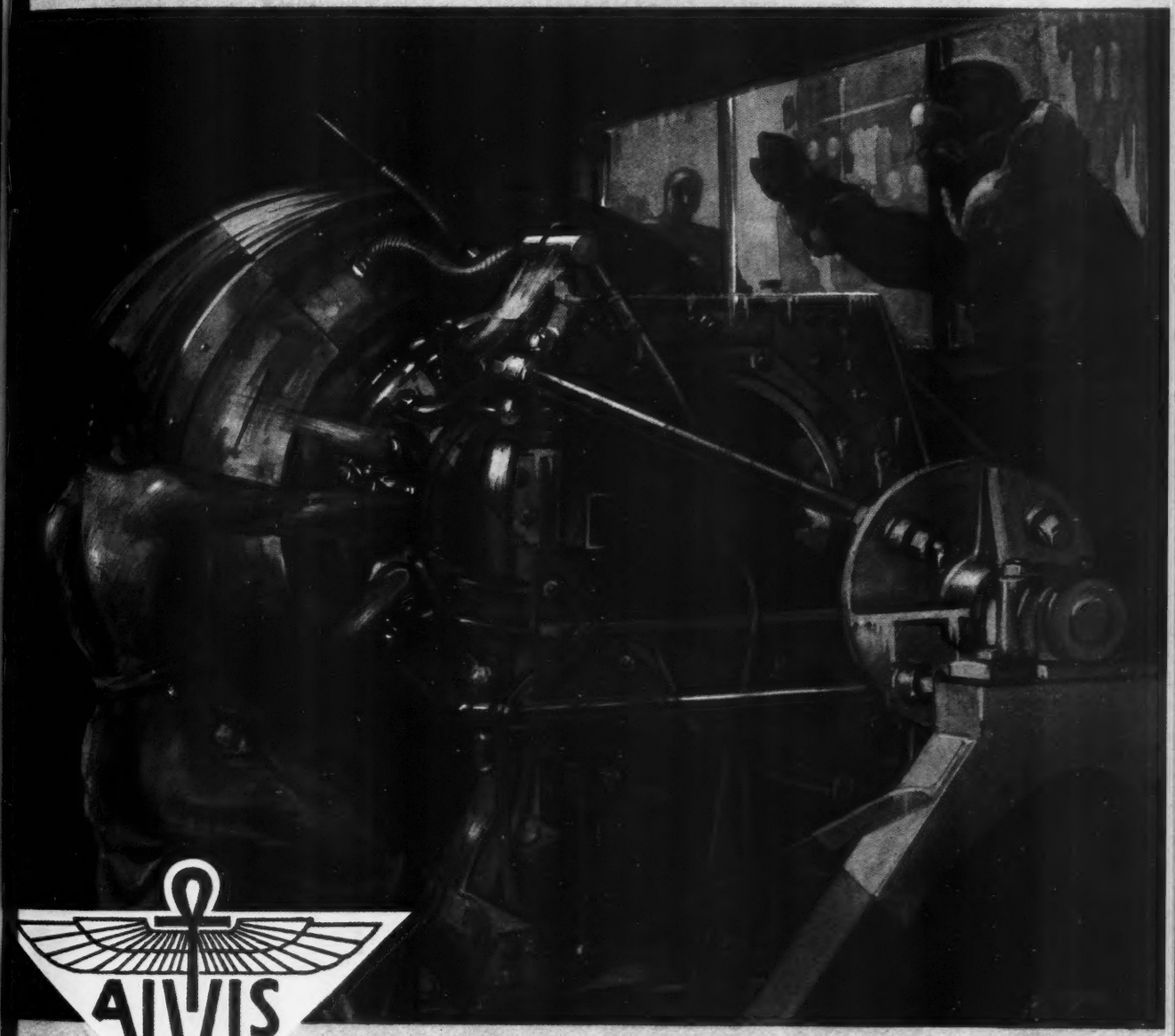
FLIGHT

and

AIRCRAFT ENGINEER

THE LIBRARY OF CONGRESS SERIAL RECORD JUN 11 1948

OFFICIAL ORGAN OF THE ROYAL AERO CLUB . ONE SHILLING

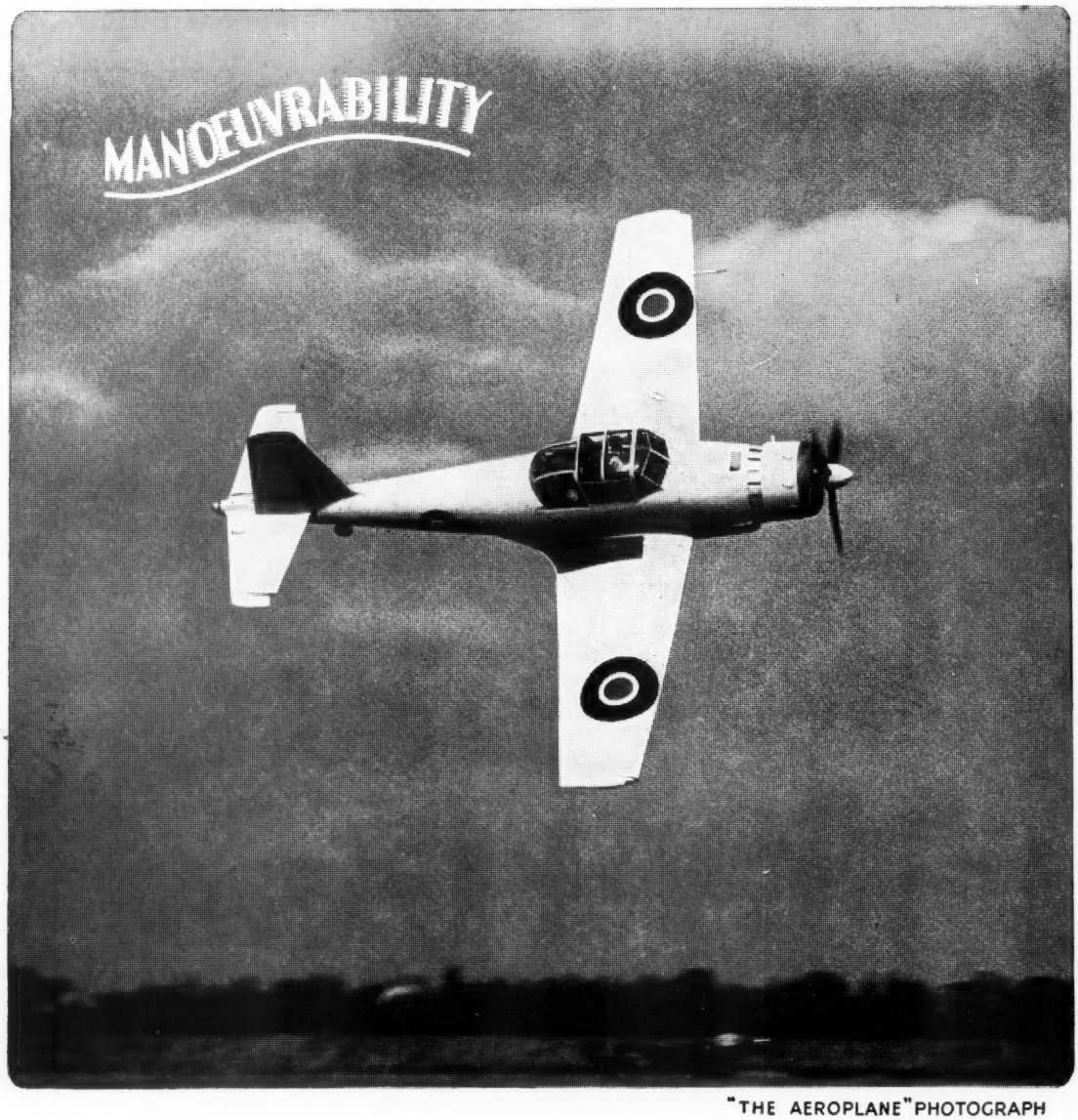


"LEONIDES"

500 H.P. RADIAL

Tested to meet climatic extremes

ALVIS LIMITED, COVENTRY



"THE AEROPLANE" PHOTOGRAPH

The manoeuvrability and handling qualities of the Balliol advanced trainer are of the standard required for modern fighter aircraft. Good co-ordination of controls relieves the pilot of fatigue and engenders a confidence in his craft that is not misplaced.

BOULTON PAUL AIRCRAFT LTD

WOLVERHAMPTON

BPA

DESIGNERS & CONSTRUCTORS OF AIRCRAFT & ARMAMENT.

WESTLAND SIKORSKY

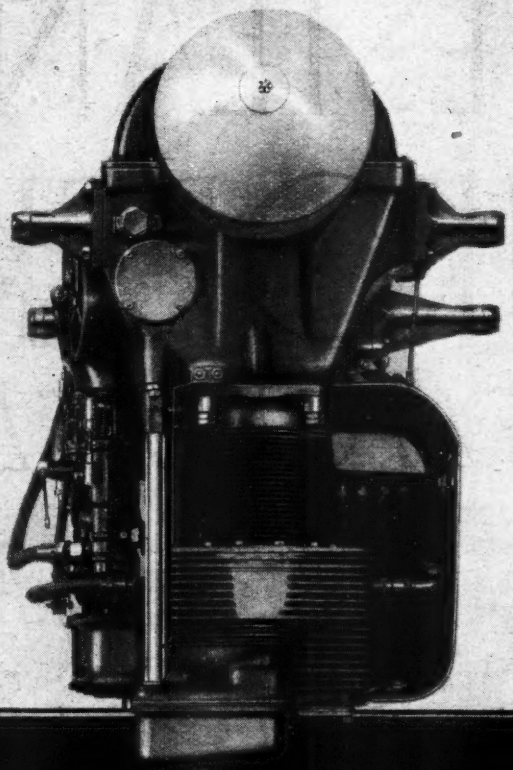
HELICOPTERS

WESTLAND AIRCRAFT LIMITED

YEOVIL · · · · ENGLAND

A

Cirrus Major



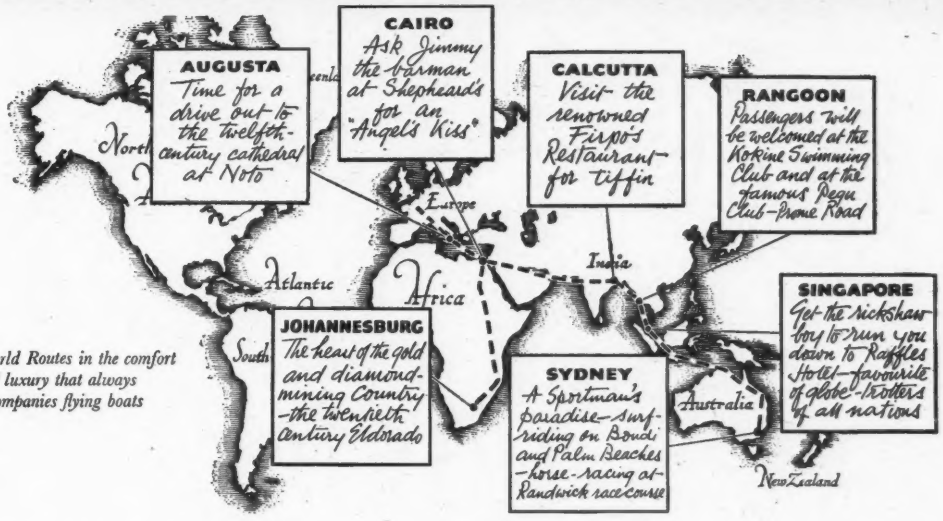
SERIES II
150 h.p.

SERIES III
155 h.p.

BLACKBURN AIRCRAFT LIMITED

BROUGH, E. YORKS. TELEPHONE: BROUGH 121

Some Short jottings for airline operators and their crews


AUGUSTA
Time for a drive out to the twelfth-century cathedral at Noto
CAIRO
Ask Jimmy the barman at Shepheard's for an "Angel's Kiss"
CALCUTTA
Visit the renowned Firpo's Restaurant for tiffin
RANGOON
Passengers will be welcomed at the Kokine Swimming Club and at the famous Pegu Club—Prome Road
SINGAPORE
Get the rickshaw boy to run you down to Raffles Hotel—favourite of globe-trotters of all nations
JOHANNESBURG
The heart of the gold and diamond-mining country—the twentieth century Eldorado
SYDNEY
A Sportsman's paradise—surf-riding on Bondi and Palm Beaches—horse-racing at Randwick race course
North
Europe
India
Atlantic
Africa
South
Australia
New Zealand

World Routes in the comfort and luxury that always accompanies flying boats

What does the modern business man want . . . ?

Who says he's in a hurry?

As air travel becomes more and more an everyday affair the popular press announce one startling record after another for reduced times between various terminals. In order to stress the importance of these facts, the press has had also to produce someone who really wanted to move about the world at these record speeds, and who fitted the bill better than the "modern business man"? He, with vast demands on his time in all parts of the world, would appear to be just the man who would be prepared to sacrifice any amount of comfort for *speed.*

Has he asked for speed?

Experienced operators of some of the world's largest and best-known airlines have dealt with every type of passenger over many years. They feel that if this type of business man exists at all he is so rare as to be almost legendary. They have other, and quite different, ideas of what the modern business man requires on his long or short journeys, by air. He wants to *waste* no time; travel in comfort, and have as pleasant a break from business routine as possible.

How to get him there on time . . .

No time is wasted where schedules can be rigidly kept and this can be achieved more easily, we suggest, with a fleet of flying boats than with any other type of aircraft. Business men—and any other passengers for that matter—want to know that they will arrive at a given place at a given time and be able to work their appointments to match. If they also have time at the intermediate stops either to enjoy themselves or do other business, so much the better.

How to make him comfortable

Give him plenty of room. Don't cramp him. Give him a cabin with not more than about five fellow passengers whose faces he can see—he doesn't want to watch the backs of their necks, or the backs of their chairs, possibly for days. Give him large windows with a wide view of passing scenery. He'll get all these and a separate promenade cabin and cocktail bar—room to move about and a changing atmosphere and view—in a Short flying boat. Soon he'll find it's fun to fly by flying boat and it's a habit that sticks.

FLYING BOAT PERSONALITIES

Captain A. Le R. S. UPTON, B.O.A.C.

CAPTAIN UPTON has, until recently, been operating on the routes with the Short Empire "C" Class Flying Boats upon which he was employed during their entire service with Imperial Airways and later B.O.A.C. He is now engaged on instructional duties with Short Hythes and Plymouths.

His flying career began in 1927, when he flew Avro 504Ks with the R.A.F. Later, he had his first taste of "marine aircraft" with the Fleet Air Arm, flying Blackburn Blackburns and 3Fs.

Captain Upton was one of the B.O.A.C. captains who assisted in the evacuation of Crete, camouflaged "C" class boats being used for the job.

Shorts THE FIRST MANUFACTURERS OF AIRCRAFT IN THE WORLD

Short Brothers & Harland Ltd., Queen's Island, Belfast

Enquiries to 17 Grosvenor Street, London, W.1

AIR FRANCE ANNOUNCE

LONDON TO RIVIERA NON-STOP IN 3¾ HOURS for NICE-CANNES-MONTE CARLO

ADDITIONAL SERVICES FROM MANCHESTER & GLASGOW

Starting June 14th, present service via Paris

NEW 4-ENGINE LANGUEDOCS seating 33 passengers, fly on this non-stop service. LONDON—a good lunch in the air with wine and food free of charge—and you are in NICE ready for the car that takes you along the Promenade des Anglais or to CANNES or MONTE CARLO. The return fare, Nice £34.6.0; Cannes or Monte Carlo £36, does not come from your currency allowance and the Riviera is making a point this summer of Sunshine and All-in accommodation at a pound a day. Other holiday services to PARIS, MARSEILLES, GENEVA, BASLE, ZURICH, CORSICA, ROME, NORTH AFRICA.

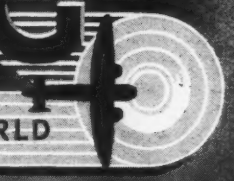
You can fly on these "same day" services, too, from MANCHESTER and GLASGOW. Ask your Travel Agent or AIR FRANCE at address below.

AIR FRANCE 52/4 HAYMARKET LONDON S.W.1 WHitehall 0971 (ten lines)

The Majority of BRITAIN'S FINE CARS & COMMERCIAL VEHICLES fit GIRLING BRAKES

AND NOW

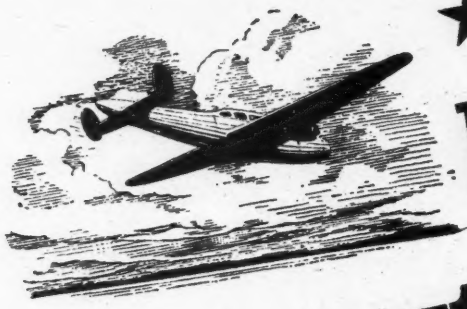
GIRLING



THE BEST BRAKES IN THE WORLD

HYDRAULIC SELF-ADJUSTING BRAKES FOR AIRCRAFT

GIRLING LIMITED · KINGS ROAD · TYSELEY · BIRMINGHAM · 11



Pitman's Aeronautical Books

Still available—

Aircraft Engines of the World, 1947

By Paul H. Wilkinson. Year after year this great Annual records the engine details of the world's aircraft. The 1947 issue is still available, and contains complete specifications and photographs of 125 reciprocating engines, from diminutive 20 horse-power glider engines to the 5,000 horse-power Lycoming XR-7755; and of 26 basic jet engines. Complete and authentic specifications and photographs of all the latest reciprocating engines of the U.S.S.R. are included. Altogether 11 leading countries are represented in this important reference work. **50/-** net. "This annual has now taken its place among the standard reference books."—JOURNAL OF THE ROYAL AERONAUTICAL SOCIETY.

Materials of Aircraft Construction

By F. T. Hill, F.R.Ae.S., M.I.Ae.E. This practical book gives a great deal of information concerning the range of materials used in modern aeronautical engineering, and includes useful facts relating to their special properties, treatments and applications for aircraft purposes. THE AEROPLANE says: "Here is one of the best books on aircraft materials and might well be taken as the standard work of reference on the subject." **20/-** net.

Gears

By H. Merritt, D.Sc., M.I.Mech.E., M.I.A.E. The author is a front rank specialist in this aspect of engineering, and his book covers the subject in all its branches. It should be in the hands of all concerned with the design, manufacture and use of gears. Profusely illustrated. Second Edition. **30/-** net.

Gear Trains

By H. E. Merritt, D.Sc., etc. This book by the same author deals specifically with change gears and epicyclic trains. Illustrated. **30/-** net.

Aircraft Electrical Engineering

By F. G. Spreadbury, A.M.InstB.E. A comprehensive handbook which fully meets the needs of advanced technicians in aircraft equipment and engineering, and provides an adequate basis for design purposes. The new edition includes all recent developments. Second Edition. **30/-** net.

Practical Aircraft Hydraulics

By S. G. Bloxham. A book of immense value to all aircraft engineers. It deals comprehensively with nearly all the standard types of hydraulically operated aircraft equipment. Of general interest to pilots and aero-engineers, it also meets the needs of students who desire to obtain Aircraft Engineers' Licences. **18/-** net.

Metallurgy

For Aircraft Engineers, Inspectors and Engineering Students

By R. A. Beaumont, A.F.R.Ae.S. Deals chiefly with steels and light alloys employed in aircraft construction. A clear and horough guide to the subject. **25/-** net.

Post this FORM for 28-page *Catalogue*

Please send me a copy of your free catalogue of Aeoronautical Books

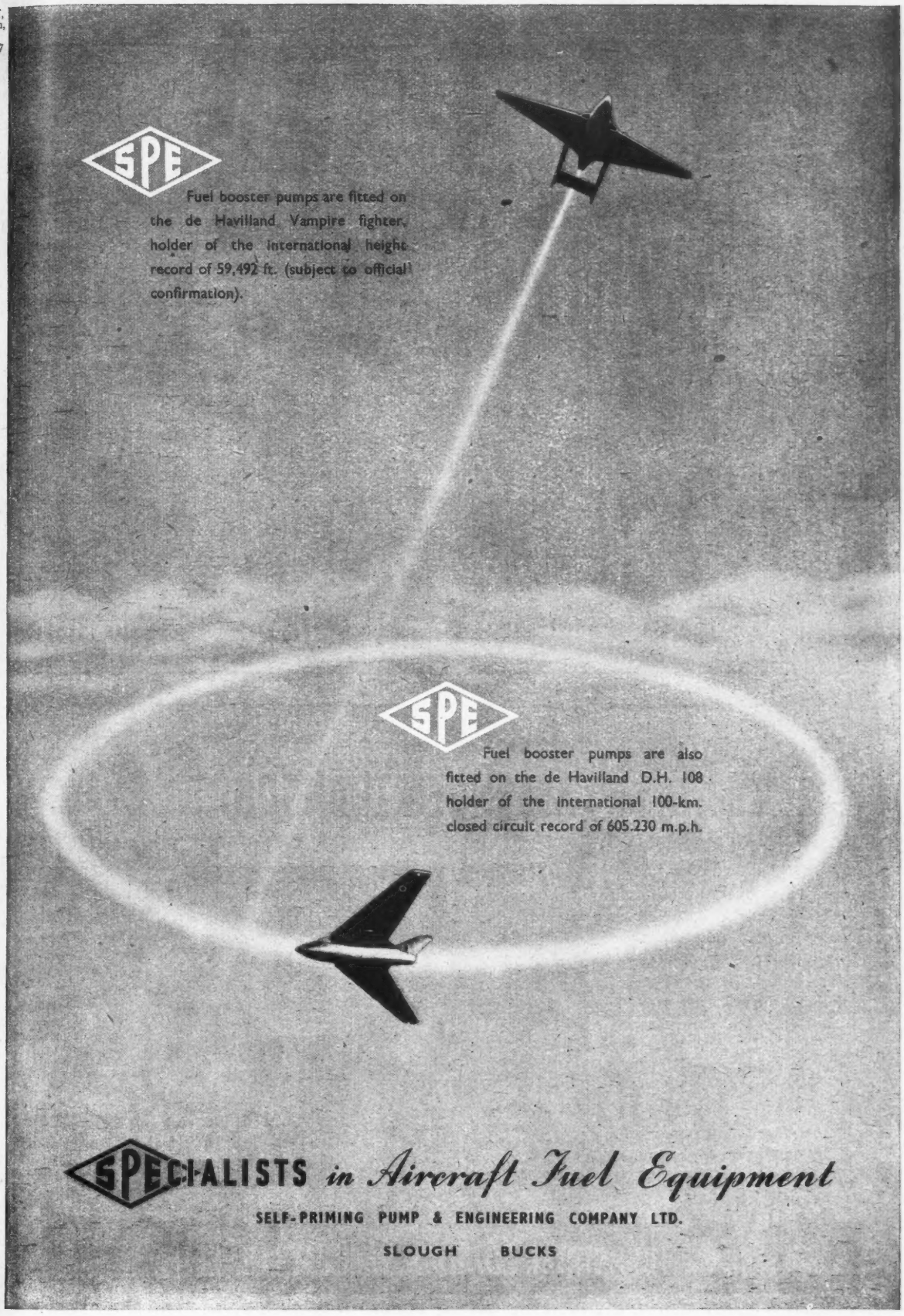
Name .....

Address .....

.....(A.3)

.....

SIR ISAAC PITMAN & SONS, LTD.,
Parker Street, Kingsway, London, W.C.2.


SPE
Fuel booster pumps are fitted on the de Havilland Vampire fighter, holder of the international height record of 59,492 ft. (subject to official confirmation).
SPE
Fuel booster pumps are also fitted on the de Havilland D.H. 108 holder of the international 100-km. closed circuit record of 605.230 m.p.h.
SPECIALISTS in Aircraft Fuel Equipment
SELF-PRIMING PUMP & ENGINEERING COMPANY LTD.
SLOUGH BUCKS

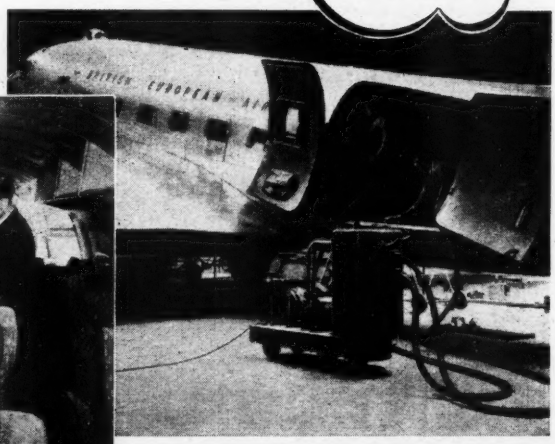
If it's DEEP DRAWING SAY "Staybrite" Steel EVERY TIME

FIRTH-VICKERS STAINLESS STEELS LTD., SHEFFIELD

Chosen for PASSENGER TRANSPORT

The System that won the confidence of BOMBER COMMAND

Experience gained during the War years gave undoubted proof that B.V.C. INDUSTRIAL PORTABLE VACUUM CLEANERS are unsurpassed for work within the comparatively limited spaces of Aircraft. Now that the Manufacture of Passenger Planes is of such importance to World Transport, B.V.C. continues to play an indispensable part. The Model illustrated has been developed largely for use in the Industry, and particulars will gladly be sent on application.



B.V.C INDUSTRIAL *Portable* VACUUM CLEANERS

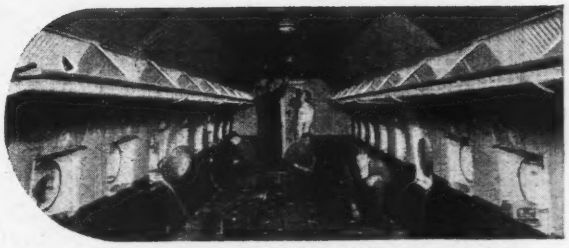
PORTABLE VACUUM CLEANERS HEAVY DUTY

THE BRITISH VACUUM CLEANER & ENGINEERING CO. LTD (Dept. F/I.) LEATHERHEAD, SURREY. *Phone : Ashtead 860.*

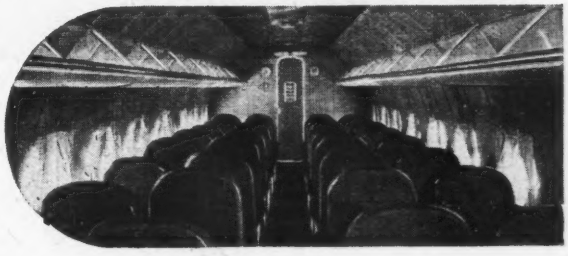
Transformation scene

Skymaster Conversions by Scottish Aviation

The Scottish Aviation Skymaster conversions are backed by many years of experience. The illustrations show a number of Skymasters in course of conversion for the Scandinavian Airlines System. We would be very pleased to quote for overhaul and conversion of C54, DC3, or any other aircraft. We have a number of C47 aircraft available for immediate delivery.



INTERIOR VIEWS DURING AND AFTER CONVERSION



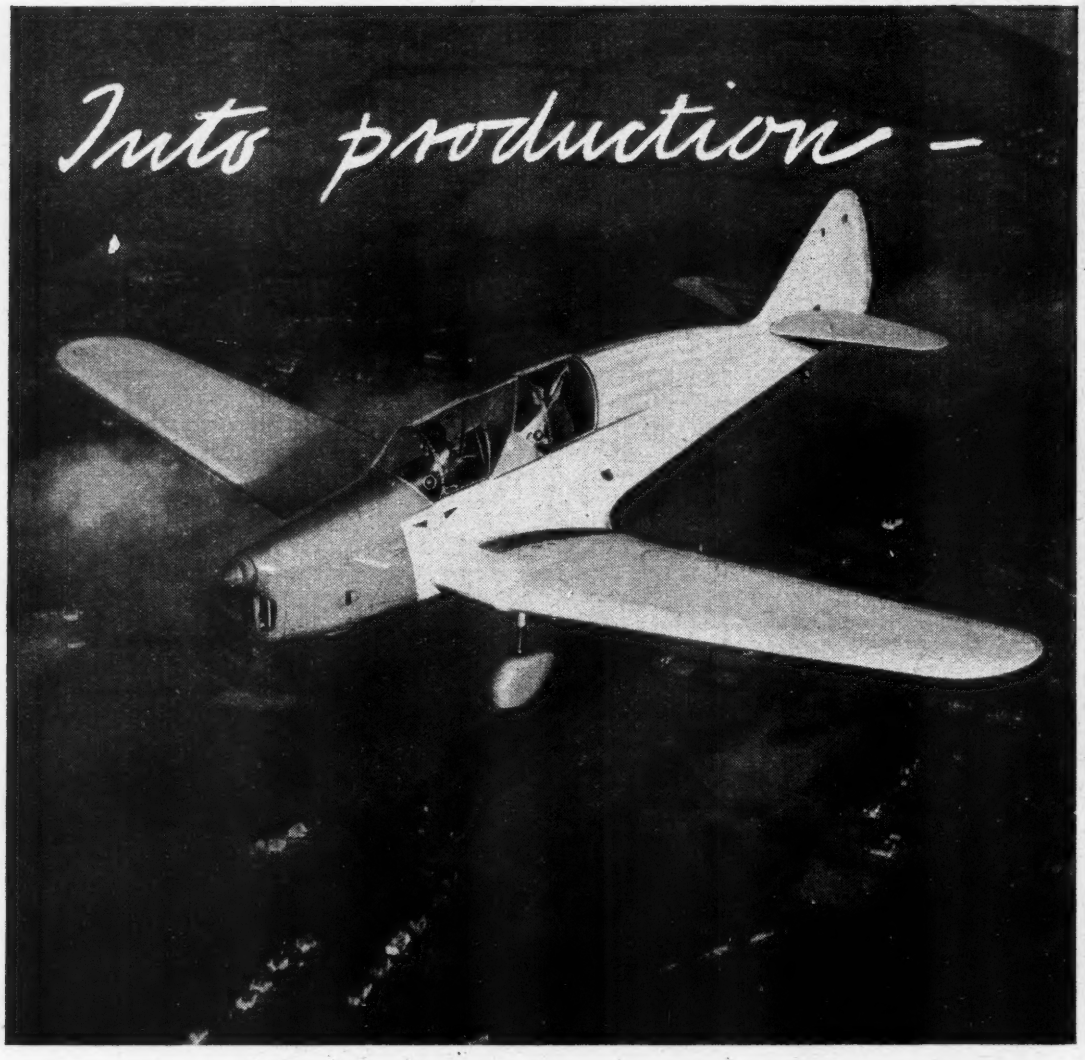
Scottish Aviation LTD

PRESTWICK AIRPORT

TELEPHONES: PRESTWICK 7272 · 9 LINES

Agents for Pakistan, Indian Union, Burma and Ceylon, Messrs. R. K. Dundas Eastern Ltd., Jehangir Buildings, 133, Esplanade Rd., Bombay. Cables: Dundeast, Bombay. 'Phone: Bombay 27024/5

R



FAIREY 'PRIMER' AB INITIO TRAINER

DESIGNED FOR TRAINING
EXCEPTIONAL HANDLING QUALITIES
RUGGED CONSTRUCTION
LOWEST COST
MINIMUM MAINTENANCE

THE FAIREY AVIATION COMPANY LIMITED, HAYES, MIDDLESEX, ENGLAND

London Office: 24 Bruton Street, W.1. Telephone: Mayfair 8791

FLIGHT and AIRCRAFT ENGINEER

Editorial Director G. GEOFFREY SMITH, M.B.E.
Editor - - C. M. POULSEN
Assistant Editor - MAURICE A. SMITH, D.F.C. (WING CDR., R.A.F.V.R.)
Art Editor - - JOHN YOXALL

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1
Telegrams : Flightpres, Sedist, London. Telephone : Waterloo 3333 (60 lines.)

COVENTRY: 8 - 10, CORPORATION ST. Telegrams : Autocar, Coventry. Telephone : Coventry 5210.
BIRMINGHAM, 2: KING EDWARD HOUSE, NEW STREET. Telegrams : Autopress, Birmingham. Telephone : Midland 7191 (7 lines).
MANCHESTER, 3 : 260, DEANSGATE. Telegrams : Iliffe, Manchester. Telephone : Blackfriars 4412.
GLASGOW, C.2 : 26B, RENFIELD ST. Telegrams : Iliffe, Glasgow. Telephone : Central 4857

SUBSCRIPTION RATES : Home and Abroad : Year, £3 1 0. 6 months, £1 10 6.

No. 2055 Vol. LIII May 13th, 1948 Thursdays, One Shilling

The Outlook

Complexity Problems . . . .

"IF there are any who still do not believe that present-day aircraft and their systems are complicated, they can be quickly convinced by being shown under the floor, behind the instrument panel, in the accessory section, or into the inner-wing leading edge in any of today's modern transports."

Few would dispute the truth of that statement, taken from one of the papers read before the National Aeronautic and Air Transport Meeting of the American Society of Automotive Engineers, held in New York last month. The author of the paper was Mr. L. R. Koepnick, chief engineer of Transcontinental and Western Air, Inc.

In examining the causes of the complexity of modern air transports, Mr. Koepnick comes to the conclusion that, although complexity is bound to exist, several bodies are responsible for making it worse than it need be.

As originators of the initial specifications, the air lines and other customers are to a great extent responsible. Manufacturers have not always installed the simplest and most direct systems to meet the requirements established by the specifications, and so they are also responsible. Government regulations, in some instances, promote the complexity, and therefore the Government is also responsible. Mr. Koepnick added a fourth: the equipment manufacturer.

Three interesting examples were given of how mechanical complexity affects delay records in T.W.A. The simple DC-3, over a period of six months, averaged 122 flying hours per mechanical delay. The slightly more complicated four-engined Boeing 307 averaged 84 hours per mechanical delay, and the fairly complicated Constellation 60 hours. On a basis of number of miles flown per passenger per delay, the three corresponding figures were: DC-3, 20,700; Boeing 307, 17,200; Constellation, 16,800. Among the whole of T.W.A.'s fleet of 110 aircraft, 95 per cent of delays were caused by the systems and accessories and only 5 per cent by structural items. The flight controls caused practically no mechanical delays, due chiefly to the fact that they are designed by the same structure-minded group as that which designs the actual structure, and so are given as much consideration as the basic structure.

Mr. Koepnick makes the very true observation (true in this country no less than in the United States) that the systems other than flight controls still appear to be "orphans," and that the designers of these systems compete with each other to obtain space and passage through structural members for their systems. In many cases, he pointed out, it is found that systems which are incompatible have to pass through the same small opening in a structure member.

. . . . and Their Solution

WHILE accepting the fact that a good deal of complexity is unavoidable in modern aircraft, due to the demand for so many systems to deal with the navigational needs and other services, Mr. Koepnick believes that much can be done to improve matters. He quotes, as an example of the sort of thing which the manufacturer can do for his part, the very extensive and complete mock-up built by Lockheeds for pre-flight testing of the hydraulic system. What, perhaps, caused so much trouble to be taken in this particular case was that the flight controls were to be operated by the hydraulic system, and so Lockheeds planned the mock-up for checking what they termed the "what-ifs." What if a pipe line to a flap cylinder ruptures? That sort of question. The result of this extensive testing was that the Constellation system has caused far less trouble in service than was expected, and less than much simpler systems in other aircraft.

Mr. Koepnick is not, however, content with taking trouble over the initial testing of complicated systems.

"Even if," he states, "each equipment item and each system is thoroughly developed, the present 'hodge-podge' design of aircraft systems is certainly inadequate, and definite improvement must be made." He then proceeds to outline ways in which this may be done.

Ideally, all the systems must be segregated. If this is properly done, items of incompatible systems are kept relatively far apart. Before the war, the electrical systems were practically segregated since they were housed in conduits. Mr. Koepnick pleads for an immediate return to conduits. As an example of how such segregation can save accidents, he quotes the DC-6, in which electric cables caused a fire by being below the hydraulic system.

Lack of standardization as between the various air lines was another source of trouble. If the manufacturer was expected to pay as much attention to each of the operating systems as he paid to the basic design of the structure and the flight-control system, he could not be expected to design three or four different heating and ventilating systems, instrument and communications systems, etc., to suit the demands of different air lines.

Mr. Koepnick is against too much "automaticity" in the systems, and he points out that in T.W.A. they saved an initial $50,000 by eliminating automatic oil-temperature regulator shutter controls and automatic cabin-pressure regulators. Another $10,000 was saved annually by not having to maintain and overhaul these items.

Just how closely American conditions resemble our own is brought out by Mr. Koepnick's remark that if a workable compromise cannot be achieved by the air lines and manufacturers themselves, there will be nothing for it but detailed government regulations. "I am quite sure that you will all agree that this is the last thing which any of us would like to have happen."

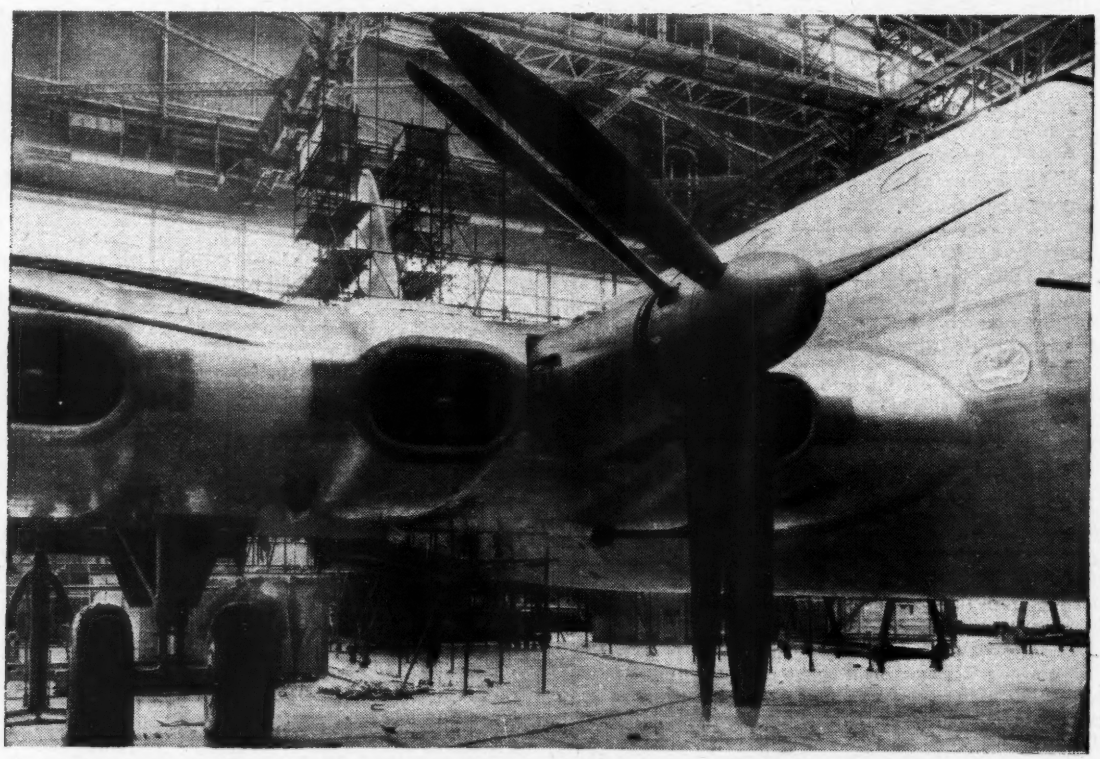
A summary of the development programme suggested for aircraft systems is published in this issue. Although the author of the paper was writing with American conditions in mind, we on this side of the Atlantic have no difficulty in finding parallel cases of our own.

That aircraft maintenance and overhaul are major items in the running expenses of an air line is undeniable, and that some degree of standardization is desirable is obvious. In the case of our own corporations, we fear it will be difficult to obtain uniformity. It is already sufficiently difficult to get clear ideas of general requirements, let alone such detailed items as aircraft systems. But the need is real, and perhaps the Aircraft Requirements and Contracts Committee recently set up by the corporations will succeed in finding suitable compromises. It would certainly make the life of manufacturers easier if standardization could be achieved.

CONTENTS

Outlook	511
Future Air Strategy	513
Friendly Flames	515
Here and There	517
Beneficent Bigness	518
Foreign Sorvice Intelligence	522
Transports for Peace and War	523
Civil Aviation News	527
The Art of the Aviation Engine	530
Keeping in Touch	532
Correspondence	535
Service Aviation	536

Forthcoming Events, page 535.



POWER CONCEALED: The eight coupled Centaurus XX eighteen-cylinder sleeve-valve engines are now snugly housed in the Brabazon's wing and their six-blade Rotol contraprops are fitted. Within a few months, under the urge of more than 20,000 horse power, the "Brab" should become airborne from the vast new runway at Filton.

FUTURE AIR STRATEGY

Points from an Address in the U.S.A. by the Commandant of the R.A.F. Staff College

AIR VICE-MARSHAL T. M. WILLIAMS, C.B., O.B.E., M.C., D.F.C., Commandant of the Royal Air Force Staff College, lately gave an address before the Air War College of the United States Air University on "Air Strategy of the Future as seen by the Royal Air Force."

The Air Vice-Marshal remarked at the outset that he was not prepared to forecast changes in the application of air power which must inevitably result from the use of new weapons. Though these were not so far in the future that we could afford to relegate their practicability only to the realms of thought or anticipation, we had to make up our minds what we were going to do with the equipment we now had, and that which we visualized having in the next ten years.

THE author has successively held the posts of Assistant Chief of Air Staff, Operations (since August, 1944) and Deputy Air Commander, Eastern Air Command, S.E. Asia (from December, 1943). Previously he was Air Officer Commanding R.A.F. Bengal, and from March, 1942, until January, 1943, Senior Air Staff Officer at Air H.Q., India. At the outbreak of war he went to France with H.Q. of the Advanced Air Striking Force and returned to U.K. in June, 1940, when he was successively in command of R.A.F. Station, Watton, Senior Air Staff Officer at No. 2 Group, Bomber Command, and Deputy Senior Air Staff Officer at H.Q. Bomber Command, before going to India.

After dealing with the definition of strategy and describing the three main categories into which it falls—grand strategy, combined strategy and service strategy—Air Vice-Marshal Williams explained that the overall aim of service strategy is "to ensure that our forces engage the enemy with all possible advantages on our side." "We in the Royal Air Force," he said, "accept this aim and we define our air strategy as the process of determining the role, development, disposition and direction of air forces in such a manner as to permit of their employment against the enemy to the best advantage in battle."

Dealing with equipment and armament, Air Vice-Marshal Williams remarked that "at the present time we regard the bomb as the chief weapon of the air forces." "The bomb," he said, "is the principal means by which the air force will attain its aim in war. Air power is exercised through a force of aircraft carrying bombs of one kind or another. The role of fighters is *not* to *apply* air power, but to create a situation which will enable bombers to do so."

In any future war our grand strategy would require security of bases until such time as our resources could be sufficiently developed to enable us to take the offensive. This did *not* imply a role of static defence until such time as we could go to the offensive. On the contrary, although the higher strategic concept of initial operations might be *defensive*, the R.A.F. must be prepared from the outset for vigorous *offensive* air operations, and must be ready to operate an independent service, or in conjunction with the Navy and Army.

Aid for Naval Forces

The Navy must have the help of air forces to maintain control of the sea, but only air defence could effectively counter invading air forces. Security of the United Kingdom had always been the keystone of British strategy, and this must continue to be the case as long as the bulk of the industrial resources of the Empire were located in these islands. Our defences could certainly go some way —we hoped a long way—in protecting us against *conventional* air attack, but the United Kingdom was very small, its highly industrialized areas were very concentrated, and whatever we might achieve in the way of defence, we appreciated that *some* portion of enemy air effort, piloted or pilotless, would get through. This would possibly be controlled and rocket propelled, and developed far beyond the stage we knew at the end of the last war.

So far as the R.A.F. was concerned our first task was the maintenance of an adequate defence against air attack, and the retention of the nucleus of a strategic bomber force capable of reducing in large measure, by attack on vital objectives, the enemy's potential to wage war on the United Kingdom. The defence of the United Kingdom as a base remained our first charge; it was the method of defence which had changed. In addition, all our overseas bases must be secured, not only as operating bases for home and Dominion fighting services, but as bases for offensive action against the enemy's possessions.

In furthering the strategic aim of the nation, a cardinal factor, complementary to the protection of our bases, was the attainment of air superiority. Any doubts ever entertained by anyone on the need for air superiority were finally dispersed in the second World War. Air forces themselves could not undertake offensive air operations without a measure of air superiority. It was an essential preliminary to every successful offensive operation, and a highly desirable condition when we were on the defensive.

We did not regard the attainment of air superiority simply as complete mastery by our fighters. It would not be a bit of good having freedom of movement, such as that enjoyed by our American and British forces in the invasion of the Continent during 1944 if, in the meantime, our bases elsewhere were subject to air attack. The attainment of air superiority included the direct attack on enemy air power and striking at all the elements which went to make up air power.

It would be very dangerous to assume that we could approach anything like a comparable degree of air superiority with that possessed at the time of the invasion of the Continent. We did not know how long it would take to build up, and what effect the activities of our potential enemies would have on our build-up. "Therefore," said Air Vice-Marshal Williams, "we regard one of the most important roles of an air force in any major war is to gain and maintain air superiority, first over our own bases, and ultimately wherever offensive operations are undertaken. Air superiority will seldom be absolute. Having attained it, we know we must fight to maintain it."

Strategic Air Offensive

The primary role of an air force, he went on to point out, was the strategic air offensive. It was certain that, in the early stages of a war, the air would be the only one of our forces with the ability to strike directly at such objectives as the industry on which the enemy's ability to wage war depended. Strategic actions by air forces could be independent, but were likely to be co-ordinated with other action, such as naval blockade, or the activities of a Ministry of Economic Warfare. Whatever might be the effects of our strategic air attacks it was certain that they would compel the enemy to deploy in protecting his own vital areas, vast numbers of aircraft, guns and personnel which he could otherwise employ directly.

Concerning sea communications, the Air Vice-Marshal said that there were people who held the view that the air could provide all that is necessary in this field, but the days when air power alone could control sea communications were still a long way off. He would go further,

Future Air Strategy . . . . .

and say that control of the routes in and out of the United Kingdom could never be fully exercised by air until all channels of supply were by air. We did not regard such a stage of development as a practicability in the foreseeable future. The required air contribution towards control of the sea would be an important and permanent charge on our air strength, and those responsible for developing our strategy must decide now what proportion of our forces were to be trained and equipped for that specialized role.

Another important function of air forces was the support of armies in the field. In the wider sense we regarded protection of our vital bases, maintenance of air superiority, and the air offensive as a major contribution to the support of armies in their preparation stage, and in the field. By this it was not inferred that armies would not require close and tactical air action in all its known forms, including air transport and airborne forces, and possibly additional and as yet undeveloped and untried methods of air support. There was no doubt that whenever armies were offensively deployed in the future they must have an appropriate scale of direct air support, and this would be one of the factors which would influence the strategical problems in despatching armies overseas.

Like every other form of war-making weapon, the type of aircraft used in tactical support had developed into a complex piece of mechanism these days. Inevitably this made for additional expense in production, with consequent reduction in numbers. We could not meet in full all the air requirements of all the services for specialized aircraft under peace conditions and, therefore, we had a priority. It was manifestly impossible to contemplate our voluntarily sending an army overseas in the next war without adequate air support. This affected the navy as well as the air force. There would be no question of our armies engaging in large-scale military operations on the Continent or elsewhere until such time as the air forces had produced a general air situation which would allow the Navy to take them there, and until the air forces required for support could be switched from more urgent tasks.

No matter how well our air forces had been developed and how skilfully the strategists had been able to arrange their distribution, we realized that there would never be sufficient, at the beginning of a war, to meet all the pressing demands made on our air forces. Very firm guidance would be required, and there must be centralized direction of the whole air effort. It was expected that in future wars every sea or land operation would be a combined affair. Air forces would inevitably be involved in every naval and military operation. Strategic air forces were also likely to be employed in an independent role, for example, in the attack of enemy industrial centres, but this would still be a part of the main strategic aim. It was essential that there should be one airman responsible for the central direction of all air forces. There was little doubt on how we in the British Empire would be mated, internationally, in another war. If and when the time for war action came we must be prepared to accept and act on centralized control of our forces.

Concluding with a reference to the Government's decision to place research and development as top priority in Service matters in the United Kingdom and to place the Royal Air Force first in our line of defence Air Vice-Marshal Williams said: "We take pride of place over the Navy and Army for the first time in our history. It is our job to prepare for the next war, not only on the basis of policy or training in peace, but in the light of past experience, and, particularly, the latest inventions and developments. Until something new replaced the old, we must work on what we know, and modify our strategy from time to time to fit the new developments. It is only by so doing that we shall be prepared to meet our commitments and, indeed, continue to exist as a nation."

Aircraft Complexity

The Growing Maze of the Operating Systems

AT a meeting of the Society of Automotive Engineers, held in New York, a paper was presented by Mr. L. R. Koepnick, chief engineer of Transcontinental and Western Air, Inc. (T.W.A.) entitled, "Simplicity as a Goal in the Design of Aircraft Systems." Editorial comment will be found on page 511 of this issue. Following is Mr. Koepnick's suggested programme for the development of aircraft systems on any new aircraft design:—

1. The airlines and other operating agencies interested in this new model should standardize their requirements for aircraft operating systems.

2. Airlines should review the minimum requirements and specify reasonable operating limitations for systems. Minimum requirements in addition to desired attainment should be specified.

3. During the design of the airplane, the manufacturer should place as much emphasis on each of the systems required in the airplane as is placed on aerodynamics, stability and structure.

4. Develop rigid specifications for systems, using only the most direct and simple manner of accomplishing the desired results. In the design of each individual system, the following points should be carefully considered:

(a) It is necessary for the system to function automatically, or is it conceivably possible to achieve the minimum or desired requirements by manual operation of the system?
(b) Analyse the cost, performance, and weight of the items specified to give automatic functions and compare with alternate items which would permit manual control.
(c) Analyse the system from a maintenance viewpoint, considering accessibility and also considering the possibility of grouping all functional items into one package.
(d) The systems must be segregated and over-all space requirements for the entire system shall be determined.

5. During the preliminary design definite space should be allocated for each individual complete system in order to provide segregation of systems.

6. Present proposed systems, including specifications, diagrams and parts lists, to the airlines or other customers for review and approval prior to completion of detail drawings of the system. Redesign the system if it is too complicated to work in service.

7. Laboratory test individual items and units of each system. Do not install unproven or undeveloped equipment—it can only cause trouble.

8. Build up a complete system to scale; first, to insure that it will remain within the confines of the space allotted, and second, to permit the complete functional testing of the system. The test programme should check the system under all conceivable conditions of operation and combinations of failures of individual items of the system.

9. One or more prototype airplanes should be flown for an extended service test period before the model is released for production.

D.H. ENGINE COMPANY'S REPORT

AT the fourth annual general meeting of the de Havilland Engine Co., Ltd., held recently, Major Frank B. Halford, C.B.E., F.R.Ae.S., M.S.A.E., the chairman, outlined the year's activities. The company, he said, had been faced with general difficulties in its reversion to a peacetime status, but these had been overcome and there had been good all-round progress.

Taking the products of the company in turn, Major Halford said that the production of the Goblin jet engine had risen steadily, and this engine besides being adopted by numerous foreign air forces had powered the Vampire which had captured the international speed record for the 100 km closed circuit. Later a D.H.108 with the same type of engine had raised the record to 605.23 m.p.h. Progress had been made in the development of the larger Ghost gas turbine, and plans were in hand for quantity production. Considerable flight testing had been undertaken, in the course of which a new international height record of 59,492ft had been set up.

Friendly Flames

"Flight" photograph.

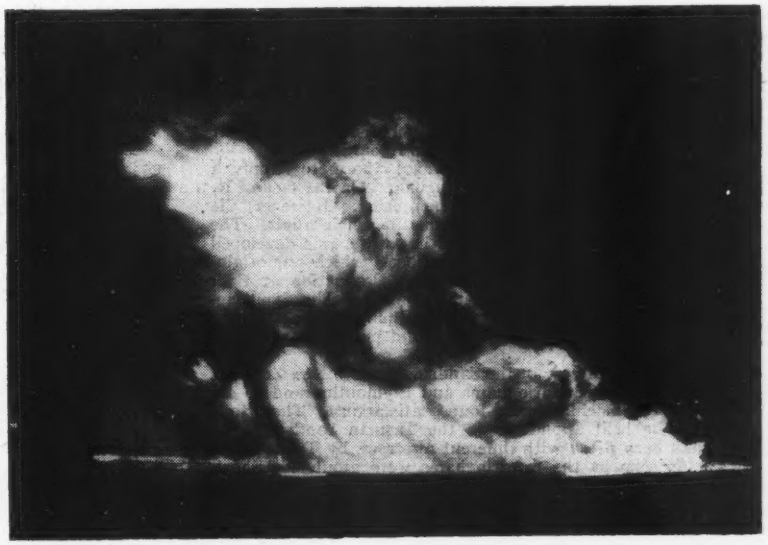
Sulzer centrifugal pumps, harnessed to Ford V-8 engines are forcing petrol through pipes on the ground and the wicks have ignited the jets : the scene during the test-burn of the Haigill Fido installation at Blackbushe last Thursday.

The Blackbushe Fido on Test : For Emergency Use Only : Ministry Reserve Right of Investigation

ANY time now an M.C.A. Notice to Airmen will announce that Blackbushe, like the R.A.F. airfield at Manston, has become available for emergency landings by civil or Service aircraft with the aid of the Fido fog dispersal system. Hitherto Manston has had the only peacetime Fido operational in the U.K.

A previous Notice to Airmen—No. 311 of the year 1947—sets out essential information concerning authority and procedure, cost, availability, layout, etc. This document lays down that Fido facilities will be provided only (a) when, owing to a sudden widespread deterioration in weather, an aircraft having passed its point of no return, is unable to reach an airfield outside the fog-affected area; and (b) when an aircraft is in a state of emergency and must effect a landing quickly within the area affected by fog. Fido, it is stressed, is strictly an emergency facility, and its operation is very costly. The fact that Fido is available must in no way influence operators to undertake flights that are unlikely to terminate at an airfield fit for visual approach or for normal instrument landings, and the Minister reserves the right to investigate each case in which Fido is operated.

It is not, perhaps, generally appreciated that no extra charge, over and above the normal landing fee, will be made for Fido in cases of genuine emergency; but should investigation show that the emergency could have been avoided by sound planning or airmanship, the operator



The early stages of a Fido burn are marked by billowing smoke which soon disperses as the system gets into its stride.

"Flight" photograph

Friendly Flames . . .

The section of pipeline (left) is not typical, being "doubled-up" to provide a greater intensity of flame near the runway intersection. The flow of petrol to a section of the pipeline is controlled by valves in one of several brick emplacements (right) alongside the runway.

may be called upon to meet the full cost of the operation attributable to the incident.

A great deal of speculation has been rife concerning the cost of a Fido operation. Official figures quoted for the Manston installation when used to land one aircraft under the worst conditions of visibility are:

Warming-up period of 15 minutes, £500.

Each subsequent minute, £250.

If an aircraft is correctly positioned it should be possible to land it within the last three or four minutes of the warming-up period. The Blackbushe installation is as expensive for this initial period as that at Manston, but thereafter the charges would be approximately 50 per cent of those at Manston.

Last Thursday night a test-burn of a portion of the Haigill Mark 5 surface-type Fido installation at Blackbushe was witnessed by aircraft operators and others interested. The equipment is essentially similar to that used by the R.A.F. during the war, and supersedes the "Hairpin" sub-surface system, the troughs for which are still in place alongside the runway. It was necessary last week to check the operation of newly installed burners on the western half of the installation, including the two sets of intersection runway burners where the installation crosses the subsidiary runway. The eastern half—including the "box" of burners at the approach end of the runway and the burner line as far as the first intersection—had been previously tested. The occasion further provided exercise of the organization for laying-on a Fido burn. Visitors were informed that as a result of experience gained at Blackbushe the policy for London Airport will be decided. Operators present were invited to examine the installation and to question those responsible for it to their hearts' content.

The core of the Fido layout is the pump room, which houses five Sulzer centrifugal pumps, harnessed to Ford V.8 engines, and each capable of pumping petrol into the pipelines at over 450 gallons a minute. In the main control valve tower are two valves controlling delivery to pipes which lie on the ground, flanking the runway, and a third valve for the markers. Gauges register up to 50 lb/sq in. Combustion is initiated by hand-ignited wicks in the form of short lengths of pipe projecting from the ground and dripping petrol, at either end of each section. When petrol is pumped into the two pipes on the ground, and is forced out of small holes, the wick flames ignite their respective sections and the flames play on a third pipe, which connects with the two ground pipes and charges them with burning-hot and highly-combustible petrol. It is posible, during the burn, to stand close enough to see the thin jets of burning petrol issuing from the ground pipes and playing on the upper pipe. Delivery of petrol to the various sections is controlled by valve assemblies in brick emplacements alongside the runway.

Mr. A. T. Harris, the Fido inspector in charge of the operation at Blackbushe last week, told us after the burn had been successfully completed that the whole installation is operated by seven men—two in the pump house, one in the control tower and four "line observers" who operate the valves supplying the various sections. Maintenance is very slight, and the burners could probably be left for five to six months without attention. For safety, however, they are constantly being cleaned with a special tool.

TASMAN TROUBLES

SHORT BROTHERS & HARLAND, Ltd., have been criticized by the Commission of Inquiry set up in New Zealand to investigate the behaviour of the Short Sandringham flying boat ZK-AME which, as we reported at the time, developed a defect in one of the Pratt and Whitney engines when on a flight over the Tasman Sea, but returned to base safely after being lightened by throwing luggage overboard.

The criticism relates to the failure of Shorts to supply a complete type record for the Sandringham. On the face of it, that might appear a fairly serious complaint. However, the facts throw a rather different light on the whole affair. The Sandringham IV, as our readers will be aware, was developed from the Sunderland V military flying boat, which was originally tested by the Ministry of Aircraft Production at their Marine Aircraft Experimental Establishment. The Sandringham IV was given a British C. of A. on June 28th, 1946, based partly on the evidence of the Sunderland performance, which was well established.

Subsequent to delivery of the Sandringhams to New Zealand, Shorts tested other Sandringhams and Plymouths, and so did B.O.A.C. The machines were found satisfactory. These tests could not be held applicable to the Tasman Sandringhams, which had been fitted with different airscrews by Tasman Airways. As soon as the Sandringhams were grounded, Shorts sent an engineer with full information on previous tests.

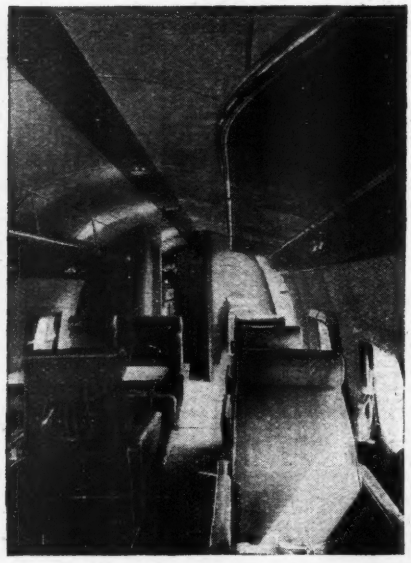
As for the complaint that no complete type record was supplied, Short's records show that a type record was sent to New Zealand in 1946, but it contained no details of three-engined performance, as these tests had been previously made by M.A.P. on the Sunderland, and in any case were not an airworthiness requirement at the time. New Zealand did not make it clear that they required anything over and above the British C. of A., which is accepted in most other countries.

Huh ! Emigrants.

Napier
'NAIAD'
GAS TURBINE
Total E.H.P.-1590.
Diameter-28 inches.
Weight-1095 lbs.
D. NAPIER & SON LIMITED LONDON W.3

RUMBOLD
AIRCRAFT FURNISHING

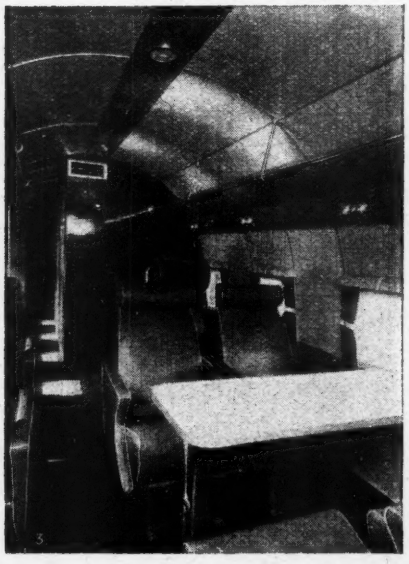
SAFETY ● COMFORT ● VERSATILITY

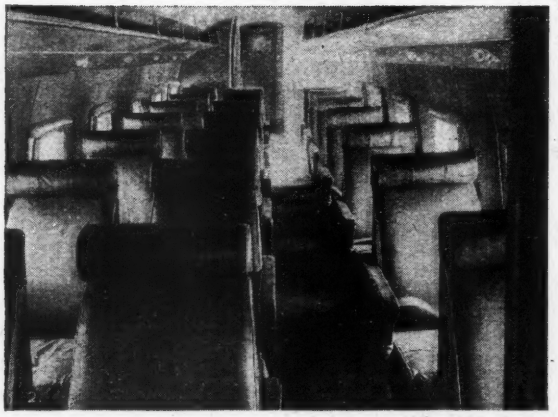


★ Rumbold Dakota Conversions.

★ Rumbold carry out civil conversions for all types of aircraft, British and American.

★ Rumbold conversions are carried out in co-operation with the leading aircraft maintenance and repair concerns.
Many conversions, for example, have been carried out in co-operation with Messrs. Airwork Limited in this country, and Messrs. Fokker in Holland.





1. RUMBOLD Executive model looking aft towards buffet and toilet.
2. RUMBOLD Standard 21-seater conversion.
3. RUMBOLD Executive model looking forward towards sleeping cabin.

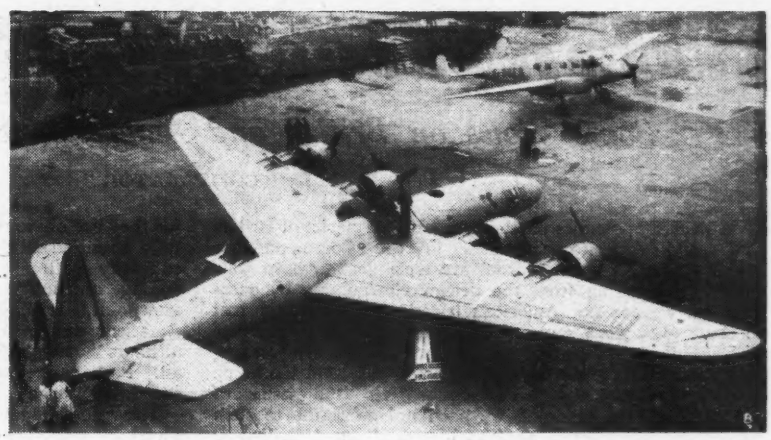
RUMBOLD

The Specialists in Comfort Engineering

L. A. RUMBOLD & CO. LTD., KILBURN, N.W.6

Telephone · MAlda Vale 7366-7-8

HERE AND THERE



PEACEABLE "P.R." : Designed specifically for high altitude photography, the French S.E. 1010 (four Gnome-Rhone 14 R engines) was the subject of notes in "Flight" of October 23rd last year. The type will be used by the French Geographical Institute for survey work in Africa.

Fairey Band's Success

THE Fairey Aviation Works Band was informed on May 3rd that it had won the International Trophy in the Musical Festival Contest at Hillegom, Holland, at which it competed against 33 other bands on April 24th. While in Holland the band played in five of the principal cities and made two broadcasts.

Britannia Trophy Presented

THE Britannia Trophy for the most meritorious performance each year in British aviation was presented to S/L. Martin, D.S.O., D.F.C., and S/L. Sismore, D.S.O., D.F.C., on May 5th. Sir Francis McClean handed the trophy to the winners at the Royal Aero Club Aviation Centre, Londonderry House, Park Lane. The award was made for their flight on April 30th-May 1st, 1947, of 6,011 miles from London Airport to Cape Town, at an average speed of 279.256 m.p.h. in a D.H. Mosquito, as reported in *Flight*, February 26th.

Fred Weick's New Post

CHAMPION of two-control aircraft and the designer of the Ercoupe, Mr. Fred E. Weick, has been appointed Distinguished Professor and Research Engineer at Texas A. & M. College, where he will be in charge of the Personal Aircraft Research Centre which is being established in the Department of Aeronautical Engineering. The programme will include concentrated research on improving handling characteristics of light aircraft, and design simplification and ease of manufacture will also be studied.

A.I.P. at B.I.F.

TWENTY-TWO of the 31 journals published by Associated Iliffe Press, the largest group of its kind in the world, are exhibited at the Castle Bromwich section of the British Industries Fair. These 22 journals cover many branches of engineering which are of interest to foreign visitors, and include *Flight* and *Aircraft Production*.

Miles Aircraft

AN application by the Board of Trade for the appointment of an inspector to investigate the affairs of Miles Aircraft, Ltd., was recently granted by Mr. Justice Roxburgh. The B.O.T. case was that when a prospectus was issued in March, 1947 (before the accounts for 1946 were published), the directors should reasonably have been expected to know that all was not well with the company, and when, in August, 1947, a dividend of 7½ per cent and a bonus of 2½ per cent were recommended, they should reasonably have been expected to know that a big loss was being suffered by the company.

Aero Research

THE well-known Swiss company, CIBA, Limited, has acquired a controlling interest in Aero Research, Ltd., of Duxford. For some time a very close technological co-operation has existed between the two companies, and now plans have been approved for a large-scale expansion of research work on synthetic resins and the manufacture of industrial adhesives. Full managerial control will be retained by the present directors and shareholders, Dr. N. A. de Bruyne and Mr. R. F. G. Lea.

FREIGHTERS for SPAIN : Four Bristol Freighters have been ordered by Aviacion Y Commercio, the Spanish business firm. Two of these left Filton on May 1st for Madrid piloted by Lieut. Col. M. Cuadra, chief pilot of the Spanish organization and Mr. W. Gibb, B.A.C. test pilot. Members of the Bristol staff saw them off.

News in Brief

Temporary conditions prevailing at a number of airfields in the U.K. are set out in Notice to Airmen No. 158. At Nutts Corner, Belfast, demolition of concrete gun posts is in progress.

* * *

One of the 12 Douglas DC-6 airliners ordered by K.L.M., of which three have been delivered, broke its back at Schiphol airport recently during a landing and take-off practice flight. The crew of four were all slightly injured.

* * *

Two new Arctic weather stations, third and fourth of nine stations being set up by Canada and the United States along possible Polar air routes, are expected to be opened at Prince Patrick Island and on the Southern Isachsen Peninsula, about 900 miles from the Pole.

* * *

Major-General E. M. Powers, who, as assistant deputy chief of the material division of the U.S.A.A.F., led a U.S. mission to Britain on gas turbines last June recently returned to continue discussions on research and development. Seven members of his service and civilian staff accompanied him.

* * *

Mr. William Allen, president of the Boeing Aircraft Company, commenting on a strike at Boeing's, hinted that the company might move from Seattle, though he did not give details.

Beneficent Bigness

Some Views on British and American Transport Trends

By "COMPARATOR"

RECENT polemics on the comparative merits of British and American airliners in the Correspondence columns of this journal are teasing enough to warrant further airing from the design viewpoint. If, occasionally, we ask our American friends to pass us the salt in order to swallow some of their purple publicity patches, it is equally in order that we face squarely the invigorating cold shower administered to British designers and the home aircraft industry by "Fact-Facer" in the issue of March 25th. In so doing we need not subscribe to such threadbare catchwords as "anti-British" or "British is best"—both of which rustic attitudes can have no objective interest whatever to the scientifically trained engineer in search of fact and not patriotic fancy. Anyway, it is a well-known fact that the combination of salt and water is cleansing to the system, so we might as well take our medicine—after which we can talk back to the doctor with a clear (and maybe quizzical) twinkle in our eye.

BRITISH constructors of civil transport aircraft have had their share of criticism during the last year or so, some more than a fair share.

While destructive criticism serves no useful purpose, and can do a lot of harm, there is much to be said for constructive comparisons.

In this article our contributor, while agreeing with some of the views expressed in recent Correspondence, takes up the cudgels on behalf of British designers in certain categories. He certainly does not agree that the British position is markedly inferior. On the contrary, in some directions it is the reverse.

Elizabethan Tradition

We will cheerfully, even enthusiastically, join with "Fact-Facer" in his strictures of the Elizabethan mentality that still prevails in certain quarters of the home industry. The really hard nut to crack in this connection is that you cannot cure such ills—or, better still, prevent them in the future—unless the patient is in a mood to co-operate with the doctor (or priest) by freely confessing his manifold sins and wickedness. One of the fashion-plate examples that occurs to us off-hand is the long time it has taken to convince some of our diehard colleagues at home that the tail wheel is a pre-war anachronism whose continued employment accurately reflects the state (and date) of the designer's mind. And the odd thing about this sort of illness is not the malady itself (which is easily cured), but the stubborn last-ditch insistence of the patient that his health is grand—if only everybody would leave him alone. In engineering, as in life, it's all a question of relativity, of course; in a world of the halt, sick and the blind, even the palsied may shimmy in blissful palpitation.

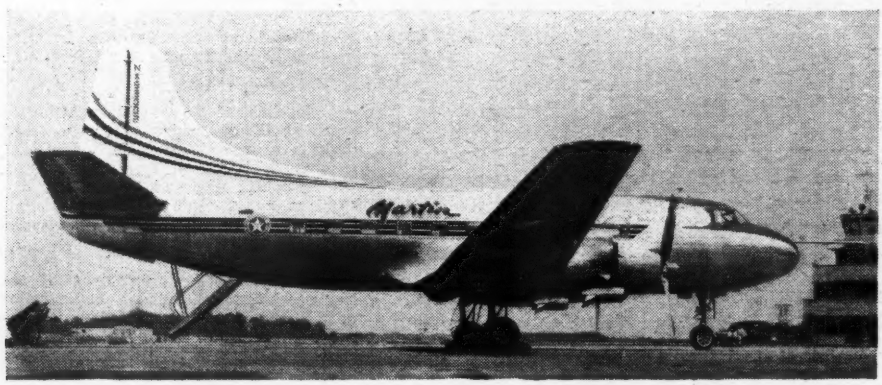
Moreover—if we have thus far escaped the editorial blue-pencil—we will still further infuriate the "British is best" school by agreeing that the Lockheed Constellation is a very good aircraft, a handsome looker as well as a handsome performer. (The two qualities always go hand in hand, for they are obviously cause and effect.) But having cheerfully admitted all these established facts, we must now part company with "Fact-Facer," much as we admire his courage and long-view patriotism in voicing an unpopular viewpoint. It may well turn out that the proponents of American design supremacy "in respect of large landplane airliners" may be wrong in a few conspicuous cases after all. Perhaps it hinges a great deal upon what we mean by the term "large" as understood at the moment.

The interesting thing is that, whereas Britain has completely "missed the ship" in the current four-engined class, it may (crossing our fingers) turn in a couple of winners at the top and bottom ends of the size-weight bracket. We refer, of course, to the Airspeed Ambassador and the Bristol Brabazon. (It is too early yet to prognosticate on the D.H. (106) Comet, still presumably on the drawing-board and last reported to have grown some tail feathers since its first tailless conception.)

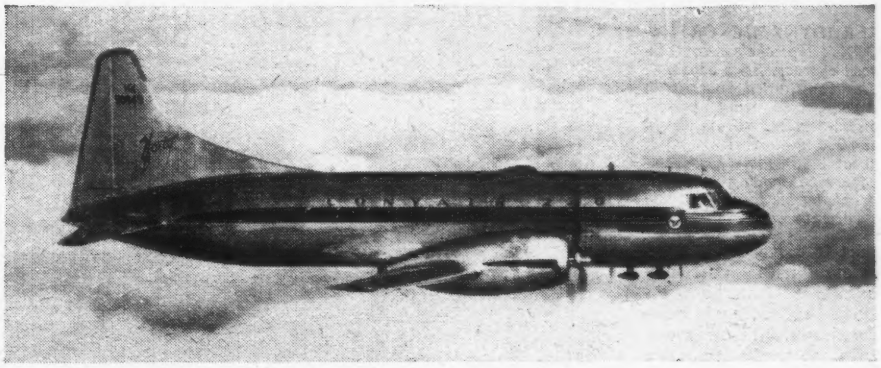
Now the Ambassador is already a *fait accompli* and will almost certainly sell itself in the 40-seater twin-engined class. And when we say that, we mean on a performance, price and operational basis against any other world competitor as known at this time. Its only two U.S. rivals are the Glenn Martin 2-0-2 and the Convair-liner, both of which are clearly inferior according to post-war engineering standards. Compare, for example, the fuselage and engine-cowl lines, and the skinning technique of the British job *vis-à-vis* the American.

Apropos which, one of the aforesaid American aircraft designers is reported to have rubbed his hands over the Ambassadorial velvet, with the remark that "he was glad his firm didn't have to compete with it on home territory!" There are many other features, external and beneath the skin, that exhibit the more advanced thinking of at least one British design team. Furthermore, if the reported current price of the Ambassador is still around the £100,000 ($400,000) mark, it should have no difficulty in meeting its American contemporaries on a straight cost basis, since we understand that the latter are roughly in the same price bracket. Happily, both "Fact-Facer" and this factual reporter apparently agree on this particular score, so let's have a look at the heavyweights at the other end of the field.

The table opposite shows the American side of the score-board—as seen by the engineer. At first sight it looks quite an impressive score, with six eggs already in the basket (or, rather, hatched and flown), as



PRE-WAR AERODYNAMICS: Pullman-car fuselage lines, barnacled engine cowls and external flap-hinge brackets of the Martin 2-0-2 are retrograde features for 1948. Nose-wheel leg geometry also looks doubtful. Built-in hydraulically-operated loading step at rear end and under-wing fuelling system are good features.



BANANA AERODYNAMICS: Box-car fuselage lines and beer-barrel wing engines, but cleaner than the Martin 2-0-2. Additional thrust from augmentor-type engine cowl, but original thermal anti-icing system supplied by hot-air from exhaust gas now abandoned in favour of more conventional installation employing a hot-air muff encircling the augmentor tube. Development of the 240 has put Convair some 32 million dollars in the red for 1947. (One would think that lower half of vertical control surface completely worthless, due to rear fuselage shape— ?)

against a couple of British hens still sitting on the nest in the shape of the Bristol Brabazon and the more lengendary de Havilland Comet. Proceeding down the score-tally, and ticking off the Constellation and the DC-6 as undisputed king and queen of the airways for some time to come, we can next put a big question mark against the Republic Rainbow, a highly distinguished aspirant still in the military prototype stage, as the XF-12 photo-recon. aircraft. (The latter specification, by the way, has all the airmarks of a polar telescope.) The projected civil version is a super-high-altitude (40,000ft) transatlantic transport carrying only 40 passengers and, despite some classic design features, does not seem to have attracted any definite nibbles by domestic airline operators—which is not surprising with most of them operating in the red and, therefore, not likely to be keen on the low revenue-earning capacity. Purely from the engineering viewpoint, however, it will be a pity if this rainbow vision does not materialize in the market place because the design conception is first-class; aerodynamically, at any rate, it is easily the best of the bunch.

AMERICAN HEAVYWEIGHTS

Aircraft	Seating capacity	Gross weight (lb)	Wing area (sq ft)	Take-off power (b.h.p.)	Wing loadg (lb/ft²)	Power loadg (lb/h.p.)
Douglas: DC-6	52–58	93,200	1,463	9,600	63.7	9.7
Lockheed: Constellation	46–50	102,000	1,650	10,000	61.8	10.2
Republic: Rainbow ...	40	116,500	1,640	14,000	71.1	8.3
Boeing: Stratocruiser ...	60–80	135,000	1,720	14,000	78.5	9.6
Lockheed: Constitution	168	184,000	3,610	14,000	51.0	13.1
Convair: XC-99	204	265,000	4,772	21,000	55.5	12.6

Note.—Take-off power of last four aircraft assumes 3,500 h.p./engine with water injection. Seating capacity of Constitution and XC-99 is based on use as Service, not Civil, transports.

The next bird on the list, the Boeing Stratocruiser (which looks more like a porpoise than a bird), is of more than engineering interest on the Home Front, in view of the trial six on order for B.O.A.C. Apparently these are promised by the end of the current year, but Pan American and certain other U.S. air carriers have prior claims on the order book—and this aircraft is not yet over its C.A.A. hurdles; indeed, it is rumoured that numerous costly changes are being incorporated.

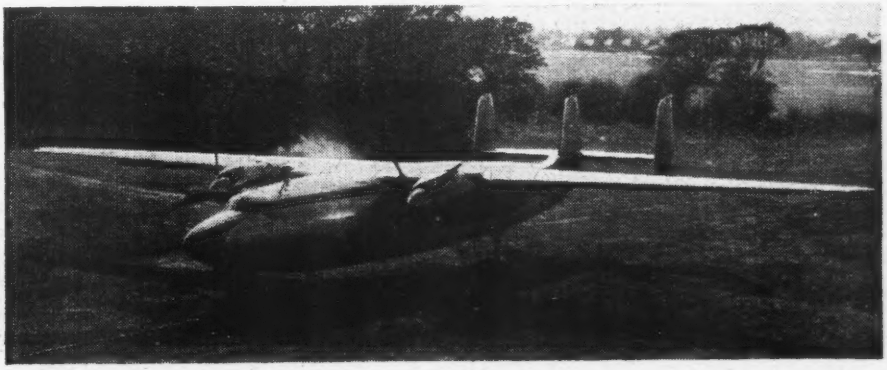
On top of all this, the Boeing Seattle plant, employing nearly 15,000 men, has just downed tools and is now on strike for the first time in its 32-year history. The betting, therefore, looks as if B.O.A.C. will be lucky to have them in fare-paying service by the following summer; meanwhile the Constellations and DC-6s arrive and depart with monotonous regularity. The more one looks at this 8-million hard-dollar deal, the more one is puzzled. It seems to us that it would have been a sounder revenue-earning and maintenance proposition to have bought additional certified Connies, instead of inflicting six more strange cuckoos upon an already overtaxed maintenance nest. Here was a chance to cut in on this summer's traffic by getting some 8 to 10 well-tried birds in the air, in place of the half-dozen not yet in the hand—indeed, still in the C.A.A. bushes.

There is no doubt whatever that the Stratocruiser will be a good, sound, engineering job by the time it does become certificated, and for the very simple reason that Boeings have had a pretty long experience in the business of building big aircraft, including a full decade of pressurization technique. The Boeing dictum that "it's what you don't see that counts" can be accepted without quibbling. Nevertheless, in the modern aerodynamic sense it is something of a mixed baggage, for it clearly suffers from what you *do* see; e.g., the fuselage and engine-cowl lines are strikingly ugly.

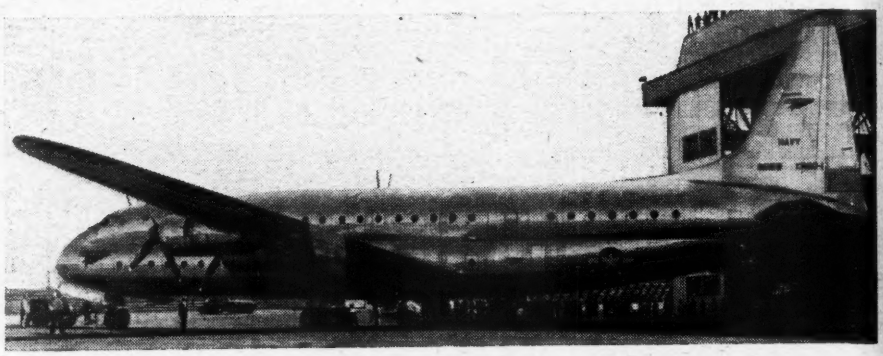
Parting of the Roads

On the other hand, the combined hydraulic power-boost and spring tab mechanism for rudder control, especially under asymmetric thrust conditions, is an ingenious bit of engineering worth studying by British designers. The external aerodynamics of the Stratocruiser owe their conception to the XC-97 military cargo-transport (also known as the Stratofreighter) and it is no more logical to expect a freighter to be a top-notch civil transport than it would be in the analogous cases of rail and sea transport. Eventually, and inevitably, the two quite different functional requirements diverge along different lines.

At this point in our table, the engineer, looking at the "Power Loading" column, begins to hear the death-rattle of the large piston-engine. The Stratocruiser, at a gross weight of 135,000 lb, is probably the last 4-engined trans-



AESTHETIC AERODYNAMICS: The acme of elegance. A beauteous blend of faired feminine curves and slim wings of manly aspect. Six small wheels, three small fins. The merest suggestion of zoot suit in a Saville Row creation—the Airspeed Ambassador.



AERODYNAMIC ORTHODOXY: Typical clean-cut Lockheed characteristics appear in the Constitution, but it is underpowered with present piston-engines. Gross weight 184,000 lb—has flown up to about 160,000 lb. Four-wheel bogie-type landing gear and double-bubble fuselage contour are noteworthy features.

port to clear the hurdles safely with currently available piston-engines now attaining their maximum take-off power of 3,500 h.p. with water injection. The argument, simply stated, is that 4 times 3,500 equals 14,000 h.p., and a take-off power loading much greater than 10-11 lb/h.p. is asking for trouble under tropical temperature conditions.

Quite obviously, then, this adds up to a vote of "no confidence" in the two remaining big fellows in their present stage of development, since both the Lockheed Constitution and the Convair XC-99 are distinctly underpowered, at any rate as civil transports. Both were conceived during the war as military or naval transports, which is hardly the ideal incubation for civil life. The Constitution, however, does manage to retain most of the familiar Lockheed characteristics of good breeding and may possibly reach the more powerful turbo-prop stage when such engines become available in the U.S.A. But one incredulous blink at the box-car aerodynamics of the XC-99 shows that it can have no possible future as a commercial passenger transport, and we fancy that its makers have no intention of offering it to airline operators, except perhaps as a cargo tramp.

Beneficent Bigness . . . .

Landing Gear Trends

Looking at the colossal single-wheel system of the XC-99 starts one speculating on the catastrophic sequence of events that could follow a burst tyre. It also reminds us that here is one department of British design that has no need to offer any apology to the world. Despite our strictures on tail wheels, British landing gears and hydraulics have generally been a jump ahead of the Americans, due to the advanced practice of such specialist firms as Dowty, British-Lockheed, and Messier. American designers, encouraged by Wright Field, are still continuing with the development of caterpillar track gears, although Dowty, who pioneered this idea in England before the war, has now shelved it in favour of multi-wheel bogies equipped with the new Dunlop squat tyre. One suspects that American enthusiasm for caterpillars is conditioned on their suitability for use in far-Northern latitudes, where conventional wheel systems would have to be interchangeable with skis. The caterpillar, on the other hand, combines both qualities and gives promise of a more universal application for a much wider variety of terrain, from sandy Pacific beaches to Alaskan snows.

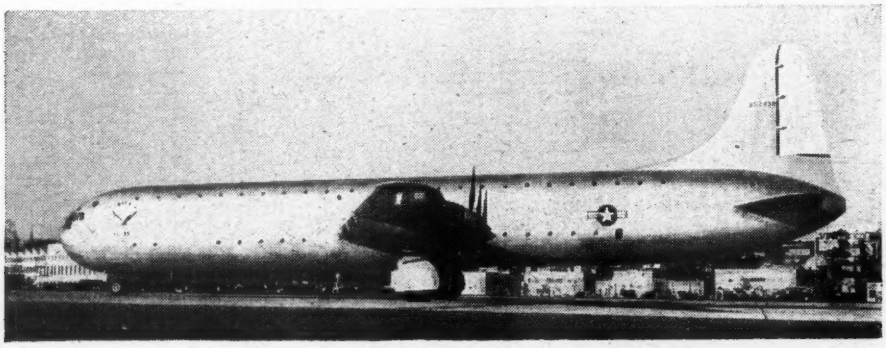
Another illuminating pointer in landing-gear design is the recent introduction by American-Lockheed of a "new type" drag-reaction shock-strut to be installed on future Connies, apparently as the result of considerable landing-gear failures—or perhaps we should say maintenance headaches. The odd fact here is that British designers long ago discovered that lever-suspensioned or articulated landing gear structures combine the dual function of vertical and fore-and-aft shock absorption, and so permit the shock-absorber to telescope effectively without binding. Due to a certain prejudice on the score of increased weight, American designers have been slow to sense the improved shock-absorbing properties which more than counterbalance any weight penalty. After all this researching it will be intriguing to see which American designer first discovers the unique and revolutionary properties of liquid springing!

While it would be churlish to deny that the Americans have built up an impressive know-how in the production and flying of really big aircraft (and especially control-boost systems), the engineering record is not quite so exhilarating as one might be led to believe—remembering that sales and publicity are handmaidens to one another, and not quite the innocent virgins they would like to appear. The engineering situation at the moment is that the designer of large civil aircraft is temporarily stalled, marking time on the threshold of a new engineering epoch which awaits the post-gestation period of the gas turbine.

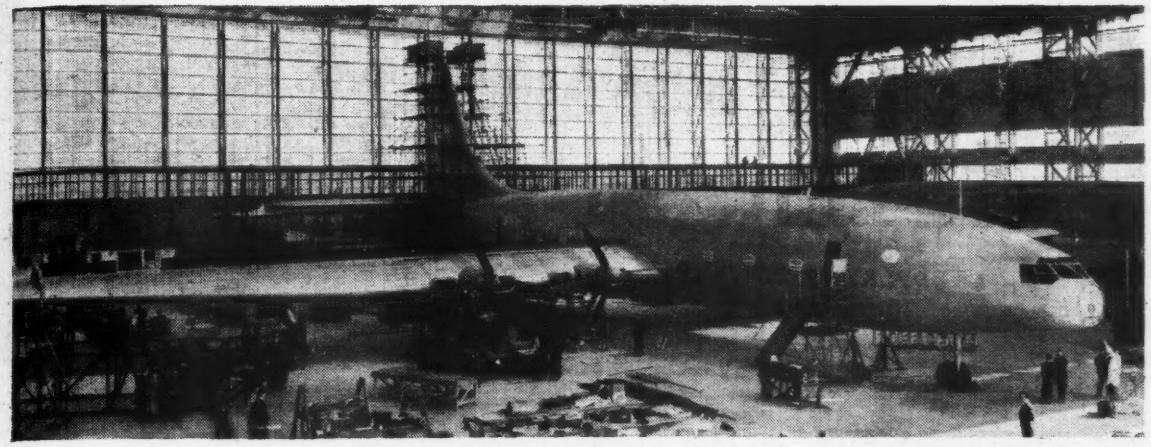
Brabazonian Background

If this premise be accepted—and we can lift our eyes from the gloom of the immediate present—the British position in regard to large civil transports looks brighter than the American, since all the wartime "super-heavies" will have to be written-off anyway; in fact, their designers must rub out and start again from scratch. Which really brings us right back to the Brabazon and the D.H. Comet. Not forgetting that the first Brab will be piston-engined at about 11 lb/h.p., the second one (with a spot of luck) should meet up with its turbo-props before the rest of the big field. Anyway, we'll keep our fingers crossed—it still looks like a good gamble to us.

There are one or two encouraging facts about



BOX-CAR AERODYNAMICS: The world's biggest landplane, the Convair, gross weight 265,000 lb., has now made six flights up to 245,000 lb., and is due to make a seventh at full load. Parallel fuselage, pusher props, and single-wheel system landing gear are outstanding features.



AMAZONIAN AERODYNAMICS: Beauty on the grand scale. The form of a Venus, the potential earning power of a prima donna. Gust alleviators by Bristol; coupled power plants à la Heinkel—the Brabazon.

the design background of the Brabazon that are not widely known, but which may have a significant effect on its potential success as a civil transport in two or three years' time—or even five if you like. The origins of this aircraft—not then known as the Brabazon, of course—actually go way back to 1942 in a Ministry specification for a 100-ton long-range bomber. This highly ambitious project was not too enthusiastically received by the Industry (which is perhaps understandable, in view of acute manpower problems at that time), but eventually some five well-known firms were persuaded to submit tentative proposals on the shape of wings to come. Perhaps the least said about most of these, the better, as four of them were pigeon-holed in the archives with a quiet shudder. Thus, by this simple process of elimination, the fifth, submitted by Bristol's, survived to run the gauntlet of the "Minute Men" for a brief, uneasy spell—until it was realized that the war might be over before the job ever got off the drawing board.

Starting from Scratch

Round about this stage of "our rough island story" (early in 1943), some long-distance planner decided to change the bomber into a post-war transport. Fortunately, our Bristol friends, Messrs. Frise and Russell, had the courage and the sound good sense to do just what we have advocated above; they rubbed out the bomber from stem to stern and restarted from scratch—without any military pistol at their heads. The resulting aerodynamic conception to-day looks good for a decade ahead, which is surely something almost unique in the history of British air transport design; hitherto it has generally been the other way round. We can offer no comments on the internal engineering of the Brab at this time, but the external aerodynamics, at any rate, are easily the best of the big brigade. In addition, then, to the possibility of turbine power-plants, it is surely an encouraging sign to see a British commercial aircraft start right by getting born handsome.

In spite of Britain's admittedly poor technical showing in the 50-seater category, we cannot subscribe to the thesis of certain political critics that the British aircraft industry ought to retire from this innings of the game and walk off the international field with its tail between its legs. We are all for confessing our sins, but dead against this new form of defeatism. As a temporary stop-gap measure we do think it would have been better economy to have purchased more Connies off the shelf, in place of Stratocruisers still deep in the bush; beyond this point, however, British designers should be given a strong lead by the Government and its airline corporations, and encouraged to develop a number of big aircraft in the 100-seater class. We simply do not believe that the current 50-60-seater of approximately 100-140,000 lb gross weight is the best answer to the Atlantic for the next ten years or so.

The American argument is that the building of bigger transport aircraft at this time is poor operating economy because increase in size tends to decrease the frequency, whereas frequent schedules generate more traffic. In other words, a couple of 50-seaters will operate with higher passenger load factors than the 100-seater. The opposite viewpoint is that the bigger the ship, the better and smoother the ride because, as size increases, so does the all-round comfort and safety through immunity from weather hazards, and this inevitably attracts the long-distance traveller. The closest parallel to air travel is the sea, and having crossed the Atlantic many times in all weathers and in ships of all sizes, from tramps to queens, we confess that the bigger the ship, the better our stomach likes it. All the economics and politics, dialectics and slide-rule gymnastics cannot stop this law of natural growth, as witnessed by the history of ocean transport over the past hundred years.

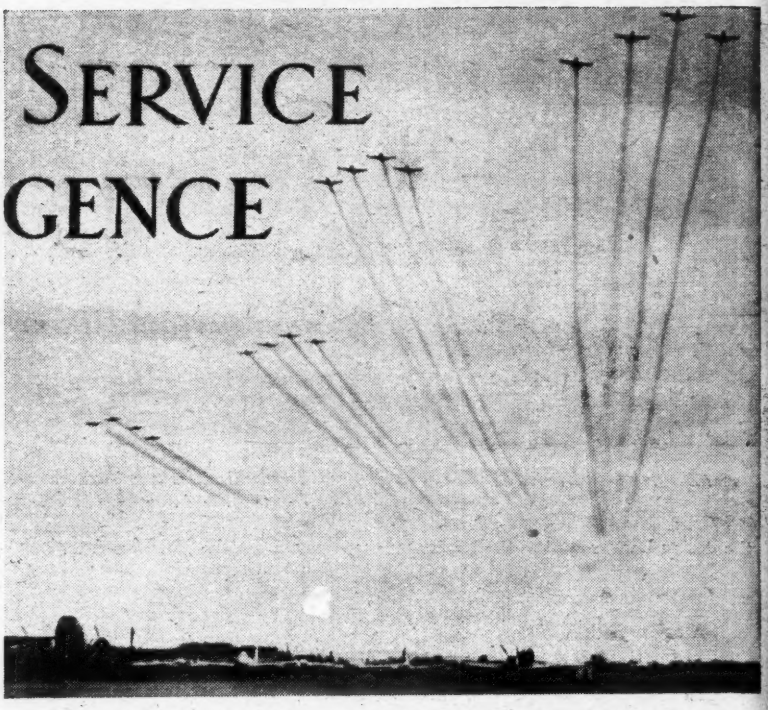
And so, in facing some of the unpleasant facts of the moment—and possibly the next couple of years—we ought, nevertheless, to be eternally grateful for those long-distance policy makers who had the audacity to strike forward along the fourth dimension of Time, by staking a few millions sterling (not dollars) on the development of bigger and faster civil transports, rather than military behemoths whose value is at least problematical during the present transitional design regime.

Thus, granted that the Treasury gods remain beneficent, the British planners seem to have covered the widest possible commercial field, with the Brabazon piston-engine and turbo-prop, the Comet turbo-jet, and the Saro turbo-prop boat. Without attempting to under-rate American engineering genius for doing things fast and in a big way, we still believe that on the civil side the future British position looks the more favourable, inasmuch as nothing tangible in this field has yet been reported from America. And we have a quiet hunch that in the long run—if *homo sapiens* can keep his trigger-finger out of mischief—the steady bread-and-butter of future commerce will pay off better than the military cake of the jittery present.

There are considerable technical difficulties still to be faced, especially the problem of runways on the Empire routes—which is one more reason why designers might find it profitable to re-study caterpillar landing gears. However, technically, by and large, we think that British designers of future heavies are on the right lines, for somehow we have never believed that the ultimate goal of subsonic design (say in the 400-500 m.p.h. class) will be patterned on box-car aerodynamics or triangular tea-trays—to name two opposing trends. Both the Brabazon and the Saro boat strike us as sound, clean-cut examples of overall design conception, without any touch of freakish extremism about them.

FOREIGN SERVICE INTELLIGENCE

- LARGEST LANDPLANE?
- BELGIAN RENAISSANCE
- U.S. AIR FORCE BILL
- SWEDISH STRENGTH



AIR POWER IN PERSPECTIVE—I: Republic P-84 Thunderjets of a U.S.A.F. fighter group pass by with their General Electric J-35 axial-flow turbojets at high r.p.m. Though having a speed comparable with that of the Meteor IV, which has 7,000 lb static thrust against the Thunderjet's 4,000 lb, these American fighters are inferior in rate of climb.

SAID to be the largest landplane in the world (the Bristol Brabazon and Consolidated-Vultee B-36 both measure 230ft in span), the Boeing B-52 bomber, now under construction, is to be powered by turbine-airscrew units. Martin and Consolidated-Vultee have prepared designs for bombers to the same programme, but work on these types has been cancelled.

A TEN-YEAR programme for the reorganization of the Belgian Air Force, which will give Belgium an air arm proportionately stronger than that of any of her partners in the Five-Power Western Union, has been announced.

The nucleus of the present Belgian Air Force was the Belgian section of our own Royal Air Force, which constituted two fighter squadrons. To-day the total strength is eight first-line squadrons, including four day-fighter squadrons; one night-fighter squadron; an army co-operation squadron and a transport group for the assistance of the army.

Working on British lines, the Belgian authorities plan to establish several additional squadrons, staffed with a cadre of regular airmen, but manned, in the main, by reservists. Lt. Col Donnet, the Chief of Organization, is a former R.A.F. wing commander who escaped from occupied Belgium in 1941.

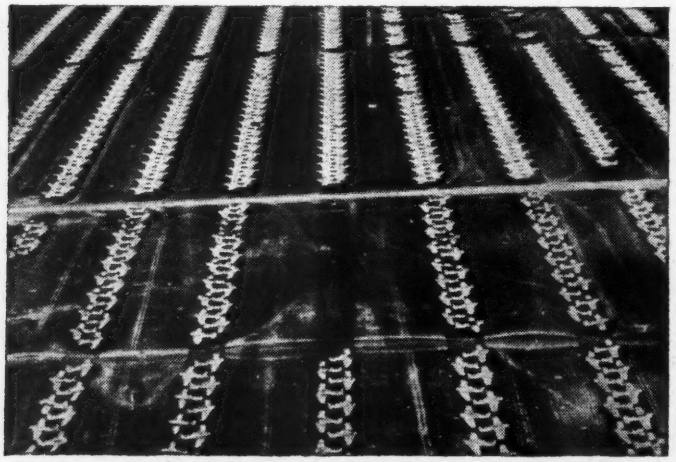
Belgian day-fighter squadrons are at present equipped with Spitfire XIVs, but by next year it is hoped to have at least one squadron equipped with Meteors. Belgian pilots are at present in Great Britain for instruction on jet aircraft.

NO fewer than 12,441 operational aircraft and 502,000 men are the aim of a Bill presented to the U.S. Congress last week. The Bill appropriates funds to finance the first part of a programme for enlarging the U.S.A.F. in two years from the present 55 groups to 70 groups. This will necessitate adding in the first year 804 jet fighters and 49 of the latest bombers—17 of them jet-propelled. The cost of the whole programme will be about £1,875 millions—about 2½ times the present appropriations. A warning by Mr. James Forrestal, Secretary of Defence, that to spend the extra money might impose "explosive pressure" on the country's already strained economy, has been overridden by Congress.

The new force of 70 groups, though a spectacular increase over pre-war strength, will be only about a quarter of the maximum wartime air strength of the United States. Less than four years ago there were 270 groups, with 80,000 aircraft of all types and 2,411,000 men.

It seems that Congressional support for the new appropriation was based on quality rather than quantity, the question having arisen whether the Air Force should be equipped with the latest types of aircraft or with wartime types now in storage.

[N.B.—The seventeen jet-propelled bombers mentioned before Congress are almost certainly of the North American B-45 type which, with four General Electric axial-flow turbojets, has a speed of "over 480 m.p.h." A crew of three is carried and there is a gunner's position in the extreme tail.]



AIR POWER IN PERSPECTIVE—II: The U.S. Air Force Bill, to which reference is made on this page, will doubtless lead to the withdrawal from store of great numbers of wartime types of aircraft, though these may be utilized only for training. This aerial view shows a few of the machines available.

A HIGHER state of preparedness and increased flexibility are the aims of a new supplementary plan for the reorganization of Sweden's military resources. According to the new plan, the fighter forces of the Swedish Air Force are to be considerably strengthened. During the next three financial years, three of the ten day-fighter wings are to be reinforced by 50 per cent and a special night-fighter wing will be established. The policy is for general conversion to jet propulsion.

High Performance for the Royal Navy

The de Havilland Sea Hornet (Rolls-Royce Merlin engines) is fitted with de Havilland handed constant-speed quick-pitch-change feathering propellers

DE HAVILLAND

light-weight

PROPELLERS

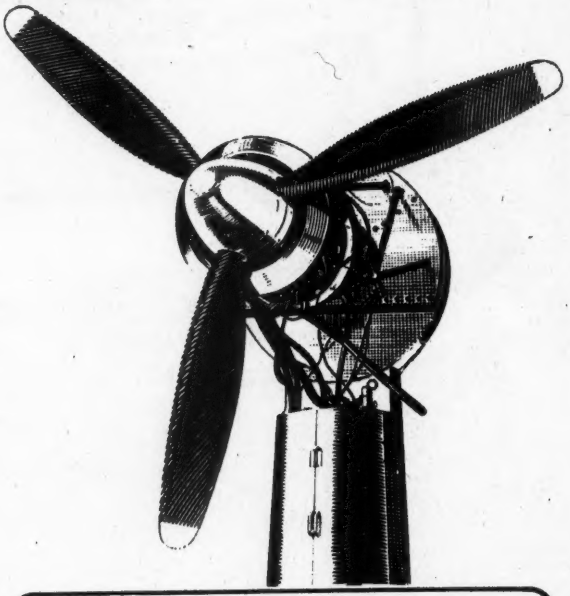
DH PROPELLERS

Aeronautics photo

POWER TODAY FOR THE PLANES OF TOMORROW

3000 hours

of development testing already

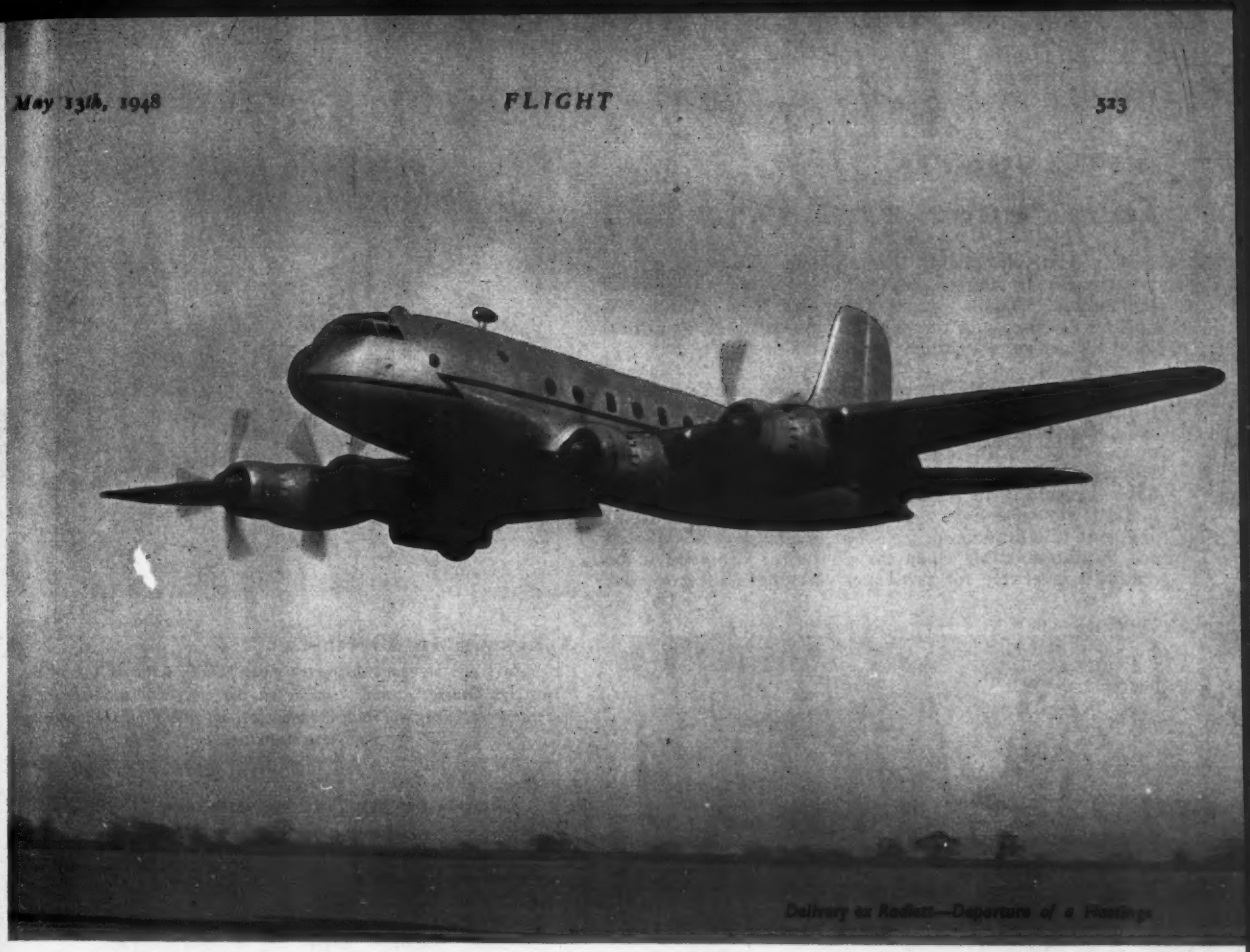


MAMBA

PROPELLER TURBINE ENGINES

ARMSTRONG SIDDELEY MOTORS LIMITED

PARKSIDE COVENTRY (BRANCH OF HAWKER SIDDELEY AIRCRAFT CO LTD.)



Delivery at Radlett—Departure of a Hastings

Illustrated by FLIGHT photographs

Transports for Peace and War

A Hastings and Hermes Mélange : Deliveries from Radlett

TO all except those dyed-in-the-wool enthusiasts who record aircraft designations and memorize their significance, as some people collect the numbers of railway locomotives, the genealogy of the Handley Page Hastings and Hermes family seems frighteningly complicated. Their difficulties are aggravated by the fact that some of the most important variants have not yet materialized. A mistaken impression has arisen, moreover, that any model of the Hermes numerically lower than the Mk IV is solely of academic interest, having given place to later developments. The following notes are designed to correct this impression and to serve as a guide to the essential features of each design.

That the Hastings C. Mk I is solely a military machine, and that it is being delivered in quantity to R.A.F. Transport Command as a replacement for the York, is by now well known. Only the one Mark has yet appeared, though certain variations of an experimental nature may occasionally be seen. The standard machine weighs 75,000 lb; measures 113ft in span and 81ft 8in in length; is powered by four Bristol Hercules 101 engines and has a tail-wheel undercarriage. The Hastings can function as a freighter, carrying a load of 7½ tons; as an ambulance, with 32 stretcher, and 24 sitting, cases, four attendants and a ton of supplies; as a trooper-transport for 50 soldiers in battle order; or as a paratrooper or glider tug. Remarkably enough, these manifold possibilities are reconciled with a very high performance; with its top speed of 354 m.p.h., the Hastings is, in fact, far and away superior in this respect to present-day R.A.F. heavy bombers.

Obviously, such a machine is potentially an efficient airliner and commercial freighter, and in civil guise the type is designated Hermes I. It is this version which may be ordered by Qantas for the Tasmanian run. Together with other Australian operators, Qantas have shown deep interest in the Hastings which has lately been demonstrating, under the ægis of the Ministry of Supply, in Australia and New Zealand. As any Hermes Is which might be ordered would differ little from the Hastings already in large-scale production, they could be obtained from Great

Transports for Peace and War . . .

Britain relatively quickly and at a much lower price than later marks of Hermes, which differ fundamentally from the military version. Australian orders would result not only in dollar-saving but would come as a welcome fillip to the prestige of British commercial aircraft in world markets.

Two versions of the Hermes I have been studied—the IA freighter/passenger transport, with military-type Hercules 101 power plants, and the IB. The latter Mark is similar to the "A" in all respects, except that it is fitted with Hercules 733 engines and rear-swept manifold-type exhausts, resulting in improved take-off, longer engine life and a lower noise level. Data relative to this new variant are given in a table on p. 525. The freight payloads quoted are those obtainable when the aircraft is equipped to be readily convertible for passenger carrying. In the event of its being operated purely as a freighter, the basic equipped weight can be reduced and the freight loads correspondingly increased, by reducing the crew from five to four and removing certain items of equipment.

The Hermes II, although at one time foreseen as a possible production model, exists only as a research aircraft, to expedite the testing of pressurizing, air conditioning and sound-proofing equipment intended for the Hermes IV and to provide data on the flying characteristics of that type. Basically, the airframe is similar to that of the Hermes IV, the fuselage being 15ft longer than that of the Hastings and Hermes I. However, the Hermes II, with its tail-wheel undercarriage, has the increased fuselage length distributed equally fore and aft of the wings, whereas the Hermes IV, having a nosewheel undercarriage, has an additional 6oin (plus 18in for the radar scanner) forward of the wings and 1ooin aft. Moreover, the power plants, interior layout, doors and windows differ from those of the Hermes IV and the passenger and crew entries move outwards and upwards, whereas those of the Mk IV open inwards and slide along the inside of the fuselage. The cabin windows of the Mk IV will be square with rounded corners; those of the Mk II are round.

Third of the main Hermes variants, the Mark III has been abandoned. This would have had the larger fuselage of the Hermes II, but was to be powered with Bristol Theseus airscrew turbines.

Characteristic data for the Hermes IV, now in production at Cricklewood, are: length, 96ft 1oin; all-up weight, 82,000 lb; maximum speed, 357 m.p.h. at 25,000ft; power units, Bristol Hercules 763. Twenty-five examples are being built for use on the Empire routes of B.O.A.C. and the first should be on test well before this year's

A Lesson in Electrics . . .

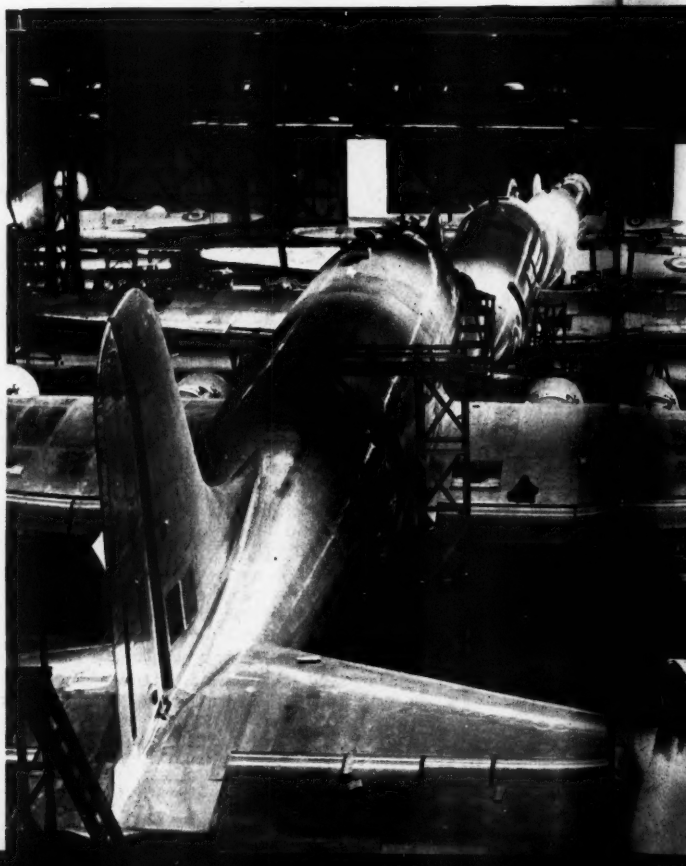
(Left) An R.A.F. sergeant instructor gives N.C.O. students, taking the "Hastings Course," some wrinkles on the electrical system of the new transport. They will return to their stations fully briefed concerning their responsibilities.

. . . Another in Aerodynamics . . .

(Above) The two views of a Hastings in flight bespeak the care exercised by the Handley Page design staff in eliminating drag. The few excrescences visible are necessary evils, called for by the Service.

. . . and Lastly One in Production

(Below) Among the finest and fastest aircraft of their class in the world, Handley Page Hastings military transports are coming through the vast hangar at Radlett in impressive numbers. Major assemblies are delivered by road from Cricklewood.



HERMES IB

Level speeds at 95 per cent a.u.w. (max. weak-mixture power)

Speed at 12,250ft	279 m.p.h.
„ sea level	239 m.p.h.
„ 10,000ft	270 m.p.h.

Payloads and ranges at 10,000ft (max. range cruising speed)

	Freighter	Passenger
Payload for 1,000 miles	15,350 lb	13,625 lb
„ 1,500 miles	13,480 lb	11,755 lb
„ 2,000 miles	10,480 lb	8,755 lb

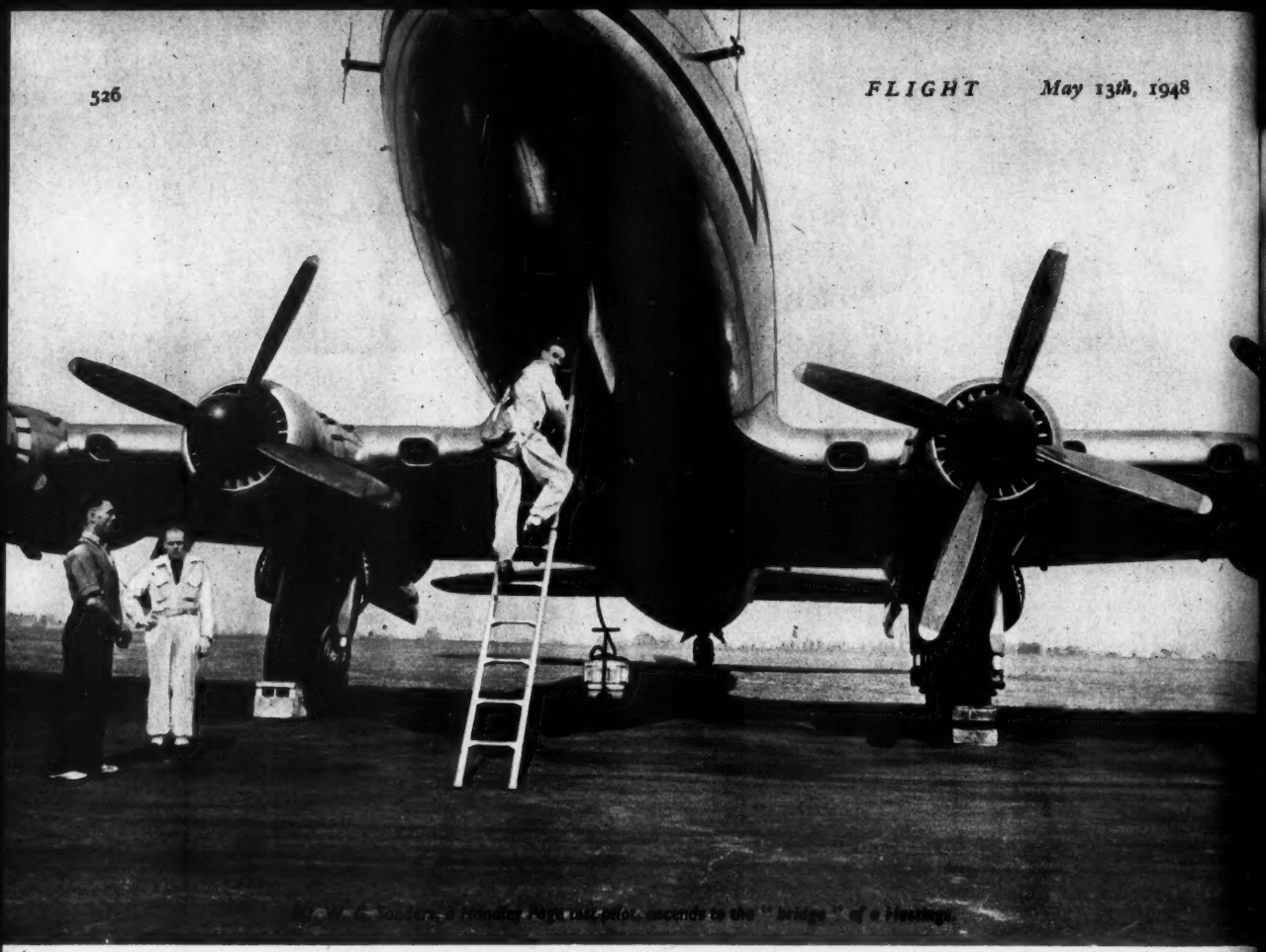
Climb and take-off at normal climb power (at 75,000 lb a.u.w.)

	4 engines	3 engines
Sea-level rate of climb	1,184ft/min	645ft/min
Rate of climb at 10,000ft	750ft/min	280ft/min
Time to 10,000ft	9.8 min	20 min
Ground run	940 yds	
Distance to 50ft	1,270 yds	
Take-off and climb speed	127 m.p.h.	

S.B.A.C. display at Farnborough, where it will be demonstrated.

Though the Hermes IV is sufficiently large to seat 63 passengers, B.O.A.C. are limiting the number of seats to 40, with a corresponding gain in comfort. A galley and dressing rooms are specified, and a cabin altitude of 8,000ft will be maintained while the aircraft is cruising at 25,000ft. B.O.A.C.'s Empire-type adjustable chairs will be installed, complete with individual lighting, book-rest tables and built-in ashtrays. The type of Bristol engine intended for the Hermes IV is no ordinary Hercules. Known as the Hercules 763, it will operate on 115/150 grade fuel and have a take-off rating (open exhausts, without ram) of 2,210 h.p., with a boost of plus 16 lb/sq in. De Havilland reversible-pitch airscrews, which will reduce the landing run by about 40 per cent, are specified. Another innovation will be a steerable nosewheel.

The Hermes V, two prototypes of which have been ordered, will be generally similar to the Hermes IV, but will be fitted with Bristol Theseus airscrew-turbines, allow-



W/Cdr. A. C. Saunders, a Handley Page test pilot, ascends to the "bridge" of a Hastings.

Transports for Peace and War . . .

ing a cruising speed of nearly 350 m.p.h. The first example should fly late this year.

These, then, are the models which comprise the Handley Page range of transport aircraft. For the present at least, the Hastings is numerically predominant. A recent visit to Radlett, where these impressive machines are erected and tested, after delivery by road from the Cricklewood works, revealed something of the scale of production. The full extent of orders for the R.A.F., however, must remain unstated in accordance with established policy.

To familiarize Service personnel with the technical features of our new military transport, a "Hastings Course" has been instituted. Three R.A.F. flight sergeants and a sergeant are giving instruction, with the aid of sectioned models and drawings, on the intricacies of the airframe and electrical installations, so that as the new aircraft are delivered to the Service, proficient maintenance crews will be ready for them.

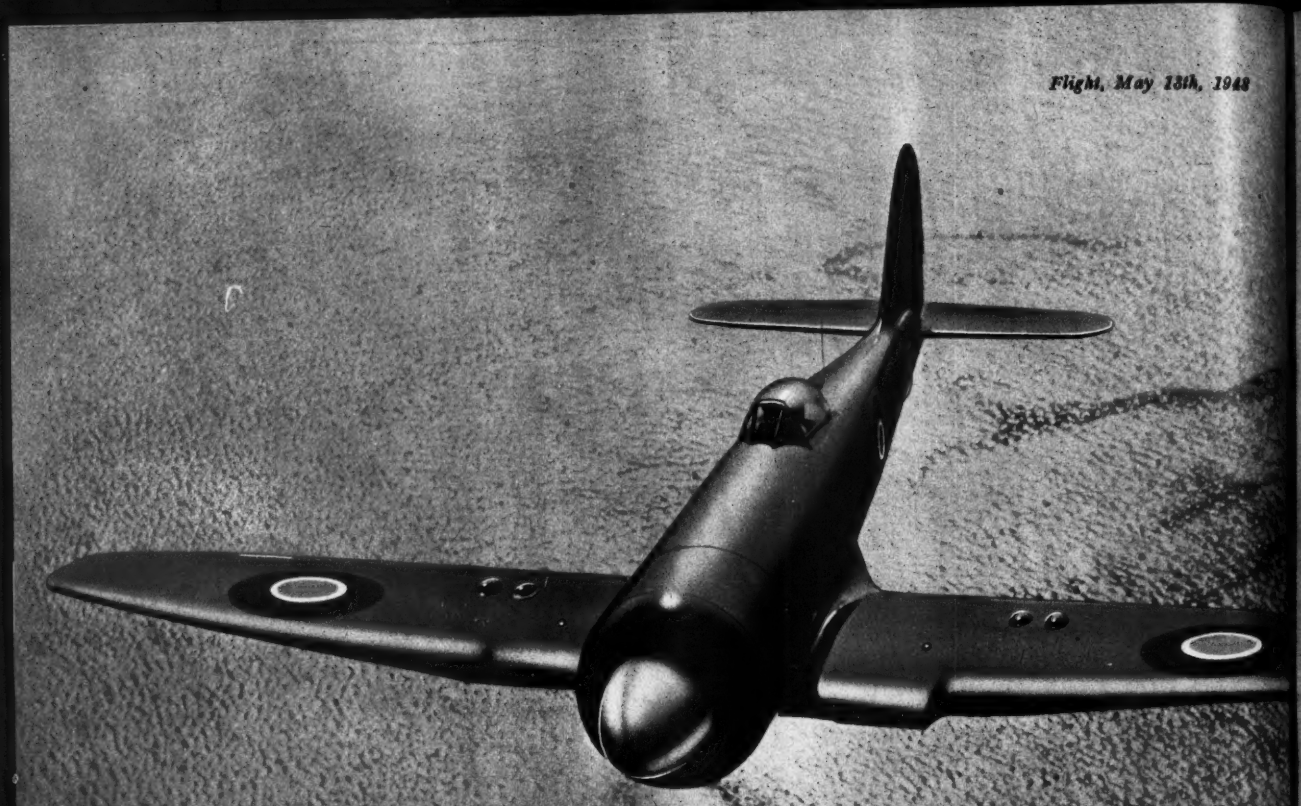
The Air Ministry has already intimated that the Hastings will succeed the York as a specialized V.I.P. transport with No. 24 (Commonwealth) Squadron and it may well be that the type will eventually form part of the equipment of the King's Flight. No greater honour can be conferred on an aircraft.

(Left) A member of the H.P. technical staff discourses on the spring tab and trim tab in the towering rudder of the Hastings. The overalled figure beneath the Hastings (below) lends scale to this imposing machine.

ROLLS-ROYCE
POWER PLANTS
For Speed & Reliability

OLLS-ROYCE LIMITED • DERBY • • London Office CONDUIT STREET W.

A.A.6



The Hawker Sea Fury is DOWTY Equipped

Undercarriage · Tailwheel Unit · Live-Line Pump and Hydraulic System

DOWTY EQUIPMENT LIMITED, CHELTENHAM

CIVIL AVIATION NEWS

EMPIRE BASE : A view of the flying boat base, showing the anchorage, hangars and slipways, at Durban, South Africa.

Pan American Airways Progress : Approach Aids at Jersey : Flight Engineers' Regulations : American Cargo Rates

WESTERN EUROPE CO-OPERATION

THE extension of the principles of "Western Union" to the sphere of civil aviation has formed the subject of informal and exploratory discussions in the U.K., the United States and Europe. The scheme being considered envisages the re-planning of timetables to avoid duplication, and the pooling of all resources including maintenance facilities; and generally would follow the lines of the successful experiment in co-operation already carried out by the Scandinavian airlines. The identity of individual airlines would, however, remain intact, as would also title to the various items of technical equipment. The plan aims at establishing a Continental airlines system which would achieve efficiency and economy, and foster the trade of the Western nations. A start might probably be made with K.L.M. and Sabena, with the British Corporations and Air France co-operating. Apart from economic considerations, such a plan would contribute to Western Europe military solidarity.

LONDON AIRPORT HANGAR PROGRAMME

A TEN-YEAR hangar building programme at London Airport was referred to by Lord Nathan, Minister of Civil Aviation, when he addressed the Society of Licensed Aircraft Engineers in London recently. In his speech, the Minister said that the scheme might take ten years to fulfil, but the programme for the next five years was based on the assumption that the four existing hangars would continue to be used to their maximum capacity, and, by 1953, B.O.A.C. aircraft on the Atlantic and Empire services would all be based at London Airport. It was hoped that the whole of B.S.A.A.'s fleet and a percentage of B.E.A.'s fleet might also be based there. Commenting on the move of the Maintenance Base from Dorval to England, Lord Nathan said he welcomed the change which would mean more work for English maintenance engineers and result in a saving in dollars. Despite the delay in the delivery of Boeing Stratocruisers, he continued, work at Filton was going ahead; but Filton as a maintenance base for B.O.A.C. aircraft on the North Atlantic services was only a temporary arrangement, and the final plan was for London Airport to be an international airport and maintenance base combined.

P.A.W.A. REPORT FOR 1947

IN the annual report of Pan American World Airways for 1947 which is published in brochure form and illustrated by photographs of the airline's activities, and charts illustrating the financial distribution, Mr. Juan Trippe, the president, declared that foreign travel by American citizens was a powerful contribution to world reconstruction. Since such reconstruction depended on dollar credits, he said, the U.S. must find ways for other countries to continue business with America. The tourist dollars spent abroad could be regarded as an effective means of providing debtor nations with dollar credits which would be available for foreign countries to buy American goods and repay American loans.

The year 1947 marked the completion of Pan American's twenty years of air transport service. That year's gross revenues for passengers and air freight amounted to $94,422,000 and $13,505,000 respectively. The gross commercial revenues, excluding U.S. mail payloads, showed an increase of 33 per cent over the previous year. The estimated net income for 1947, after provision of tax reserves, was $2,960,000, which, Mr. Trippe said, represented only 2 per cent of the gross revenue and a return of less than 2.8 per cent on the company's average investment. New services opened up by Pan American during 1947 included routes across the Atlantic, to the Middle East and India, and across the Pacific to Japan and Eastern Asia. The passenger capacity of aircraft operating in the Pan American system increased 47 per cent during the year under review. The fleet at present includes 81 four-engined passenger aircraft, 47 twin-engined passenger aircraft, and four four-engined and seven twin-engined freighter aircraft. In 1948 it is hoped to add 40 new aircraft.

B.O.A.C. AID TO IRAN

PILOTED by Captain M. W. Haddon of B.O.A.C., the first of three Doves to be delivered to the newly formed Eagle Airlines of Iran, left England recently for Teheran. Continuing its policy of affording assistance to those countries interested in the development of civil aviation, details of which appeared in *Flight*, January 29th, the Corporation is seconding experienced crew members and technical staff to the Iranian company to give instruction in operating technique and ground organization. The chairman of the new company is Mr. Ali Asghar Hekmat, the managing director is Mr. Mohandes Feza Shahidi. Mr. A. E. Hill, of B.O.A.C., has assumed the appointment of general manager with headquarters in Teheran.

INSTRUMENT LANDING EQUIPMENT AT JERSEY

MARCONI instrument landing equipment is being installed at Jersey Airport, which during the summer has a particularly high density of traffic. The British version of the Instrument Landing System, required under I.C.A.O. regulations for international airports, and known as A.B.A.S. (Aircraft Blind Approach System), is to be installed. The ground equipment will consist of duplicate azimuth transmitters

Civil Aviation News . . . . .

located at the end of the runway and on its centre line. These transmitters, operating on V.H.F., provide precise horizontal final approach guidance. Vertical approach guidance will be given by duplicate glide path transmitters working on ultra-high frequency. Three marker beacons will indicate to pilots the distance from the touch-down point. V.H.F. direction-finding apparatus, capable of remote operation over normal telephone lines up to distances of about 30 miles, will be part of the new equipment. Other Marconi apparatus already installed at Jersey Airport include V.H.F. and M.F communication equipment and M.F. direction finders.

NEW U.S. CARGO RATES

MINIMUM air freight rates, after lengthy consideration, have been laid down by the Civil Aeronautics Board. In a statement accompanying the order, the C.A.B. said that the previous rates were a danger to the sound development of the air freight industry and were in conflict with the Congressional declaration of policy against destructive competitive practices. Since these rates did not compensate carriers for current costs, the continuance of such rates would have undermined the authorized experiment of testing the ability of air freight carriers to contribute to the national economy. The following minimum rates have therefore been laid down: For the first 1,000 ton-miles in any one shipment, 16 cents per ton-mile; and for all ton-miles in excess of the first 1,000 ton-miles in any one shipment, 13 cents per ton-mile.

SOUTH AMERICAN SAFETY

THE Brazilian Ministry of Aeronautics has ordered one hundred altimeter setting indicators from the Square D Company's Kollsman Instrument Division. Described in the August 1st, 1946 issue of *Flight*, this useful development in instrumentation takes the form of a ground unit which continuously sends out its own barometric setting in the form of a coded radio signal. This is received in the aircraft by compact light-weight radio sets, where it is de-coded and the settings of the altimeters in the aircraft are automatically altered accordingly. The altimeter setting indicator is made in three different field elevation ranges of 1,030 metres each, so that only three instruments are necessary to cover a range of airfield altitudes from −30 to 3,040 metres. The instrument is calibrated in half millibars from 950 to 1,050 millibars.

HERMES IV MOCK-UP: Sir Harold Hartley and Sir Miles Thomas, chairman and deputy chairman respectively of B.O.A.C., recently visited Handley Page's Ltd., at Cricklewood to inspect the mock-up of the Hermes IV and see for themselves the progress in the construction of these aircraft, twenty-five of which are being built for the B.O.A.C. Empire routes.

MORE CREW FOR HEAVY AIRCRAFT

A RECENT amendment to the Civil Air Regulations by the Civil Aeronautics Board, Washington, requires flight engineers to be carried in all aircraft certificated for more than 80,000 lb maximum take-off weight. Aircraft weighing more than 30,000 lb maximum take-off weight may also be required to carry a flight engineer where such crew member is considered essential for safe operation. Under these regulations, which do not come into force until December 1st, 1948, to allow time for the training of additional personnel, Douglas DC-6s and Boeing 377 Stratocruisers, and on certain routes DC-4s, will be operating with increased crew. The amendment to existing regulations was made after an inquiry conducted by the Board, as a result of which it was concluded that the addition of a flight engineer would enable pilots to concentrate on the actual flight of the aircraft, radio operation and receipt of traffic control clearances, particularly during instrument conditions when such attention is essential.

BREVITIES

The Scottish Division of B.E.A. have during the past year carried 1,282,910lb of freight, mail and excess baggage, of which 603,317lb were freight, 117,143lb were excess baggage, and 562,450lb were mail.

* * *

Mr. G. S. Lindgren left London Airport on May 4th for Montreal and Dorval to discuss the transfer of the Dorval base to Britain. He arrived on May 6th.

* * *

Lord Macmillan, president of the inquiry into the loss of the *Star Tiger* visited London Airport on May 5th to inspect a Tudor IV and fly in an aircraft similar to the *Star Tiger*.

* * *

The B.O.A.C. Solent service to South Africa started on May 4th. Two flights a week are scheduled to start with and these will be increased to three a week in each direction shortly. The return fare is £301 and this includes hotel accommodation.

* * *

With the introduction by British Commonwealth Pacific Airlines of a scheduled service between Sydney, Australia and Vancouver, it is now possible to fly round the world in 12 days on British and Empire lines. The operators providing this service are B.O.A.C., Qantas, T.C.A. and B.C.P.A.

* * *

A D.H. Dragon on a flight from England to Alice Springs, Central Australia, crashed on May 6th when only 200 miles from its destination. The aircraft was taking off from Daly Waters airfield, Australia, and the accident was followed by a fire from which Mr. C. Hourigan was dragged unconscious. The four passengers were rescued, but were badly injured. The aircraft was purchased from a disposal centre in England.

A Martin 2-0-2 aircraft was recently used in emergency relief work arising out of the uprising in Bogota, Colombia. Piloted by Captain Julio Araque, and carrying penicillin, sulfa drugs, powdered milk, and canned meats, a gift to the Colombian Government from Venezuela, the aircraft returned with 19 evacuees after taking off from Pecho airport, near Bogota, one of the highest airports in the world at an altitude of 9,500ft.

* * *

Mr. Harold Seabrook-Smith, A.M.Inst.Ex., formerly commercial manager of the Lancashire Aircraft Corporation, has been appointed general manager of Westminster Airways, Limited, and commenced his duties on May 3rd. Mr. A. Neville Stack, who has been working with Skyways, Limited, since the summer of 1946, has recently joined the Lancashire Aircraft Corporation.

* * *

Airline officials in New York expect that this year more passengers will cross the North Atlantic by air than by sea. Last year the sea passengers numbered 575,000, whilst those who travelled by air totalled 385,000. Increases in bookings for the first three months of this year showed that 26,026 passengers made the North Atlantic crossing compared with 22,362 passengers carried by Pan American, A.O.A., T.W.A., B.O.A.C. and Air France during the corresponding period in 1947.

* * *

Pan American Airways have appointed two new U.S. District Sales Managers: Mr. Richard A. Catoni at the new Minneapolis district office and Mr. Axel Mikkelsen at the St. Louis office. At the same time as the announcement of these appointments

it was also announced that Mr. Tolbert A. Rice is to be assistant district sales manager of the New York district office and Prescott S. Bush, New York District Reservations Manager.

* * *

The hours of service of fixed telecommunication facilities at civil aviation stations in the United Kingdom are contained in the appendix to Notice to Airmen No. 154.

* * *

The temporary closure of Kirkwall (Hatston) airfield has been necessitated by extensive development work which is being undertaken there. All facilities have been withdrawn and the runways are marked with standard unserviceability markings. Grimsetter airfield three miles S.E. of Kirkwall and four miles S.E. of Hatston has been opened for use. Details of Air Traffic Control facilities at Grimsetter are published in Notice to Airmen No. 156.

* * *

The three British airline corporations, B.E.A., B.O.A.C. and B.S.A.A., flew 13 per cent more aircraft miles in December, 1947, than in December, 1946. Passenger miles increased by 12 per cent, mail ton-miles flown by 25 per cent, and freight ton-miles increased by 64 per cent over the previous year. A feature of the 27 per cent increase in passenger mileage for the period April to December, 1947, has been the development of shorter distance operations, internal figures showing, at 42 million passenger miles, an increase of 65 per cent on the same period the year before.

* * *

Passengers and freight carried by B.E.A. between London and Continental cities during March, 1948, were more than double the totals carried in March, 1947. An increase of 5,000 lb more mail is also shown in the latest traffic figures. The total distance flown on Continental services was, however, increased by less than 50 per cent, which indicates an improvement in traffic density. The actual figures for Continental passengers are: 5,716 in March, 1947, and 11,470 in March, 1948. The respective figures for freight are 136,400 lb and 365,291 lb.

* * *

Consequent on the situation in Palestine, Air France's New York-Lydda services now terminate at Paris, the former Paris-Lydda-Cairo service proceeds direct without the intermediate halt at Lydda, and the services to Lydda have been completely suspended. Other modifications in the company's summer schedules include two additional transatlantic services per week in each direction, and an earlier departure on the flight to India which involves a night stop at Paris for travellers from Britain instead of proceeding the same day as formerly.

FROM THE CLUBS

In order to clarify the position relating to the new M.C.A. landing charges for club aircraft, we should like to point out that the new scales of landing fees, announced in *Flight* on May 6th, do not apply to holders of annual season tickets or landing cards permitting pilots to land at specifically listed State-controlled airfields. The new scales, however, do apply to casual landings on M.C.A. airfields by pilots not holding the annual "season" tickets.

* * *

There was considerable improvement in flying hours during April at the Northamptonshire Aero Club, and a busy flying season is anticipated. Six new members have been enrolled, and the club's instructor, who is completing a 2nd Navigator's Certificate course, is expected to return shortly. Preparations are well in hand for the entertaining of competitors and visitors from all parts of the country for the Rally of Model Aeronautical Engineers to take place on Whit Sunday and Monday as announced in *Flight* last week.

* * *

On May 1st the Orkney Flying Club came into being unofficially, and for the next six months will be going through a development stage. During this initial period membership will be open to all who are interested for a fee of 10s per person. A number of informal gatherings are to be arranged to discuss the club's future activities and also the question of training members and prospective members for flying and ground qualifications. On June 5th a demonstration will be given by a Miles Messenger aircraft, and another demonstration possibly of another type has been provisionally fixed for May 14th. Prospective members of the club include six fully qualified pilots, three of whom are experienced on gliders. Applications for membership should be addressed to the Secretary, the Orkney Flying Club, The Ayre Hotel, Kirkwall, Orkney.

FOUR PIONEERS: Photographed at the South Coast Flying Club are (left to right): Commodore F. May, Mr. C. L. Pashley, holder of "B" licence No 22, Capt. H. Duncan Davis, chairman of Brooklands Aviation Ltd., and Mr. G. A. Broomfield, friend and helper of the late Col. S. F. Cody.

* * *

The date for the Midland Aero Club's "At Home" has been fixed for Saturday, July 10th. At present the club provides light refreshments in the clubhouse on Sunday afternoons, and if there is sufficient demand it is hoped to provide these amenities on weekdays as well. The bar will in future be closed on Tuesdays, but will be open on Fridays. Tuesdays and Saturdays at the club are "patrol nights," when club aircraft are available for members wishing to join parties to visit neighbouring clubs.

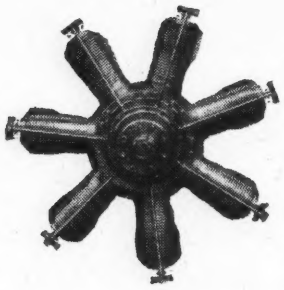
* * *

The Herts and Essex Aero Club held their first post-war flying competition for the Wrighton Challenge Trophy on Sunday, April 25th. The contest took the form of a "strip-map" cross-country flight. Each competitor was handed a map strip 10 minutes before the time of his take-off. On the map strip, 18 miles distant from the start, was a pin-point which had to be correctly discovered, marks being awarded for the general accuracy of flight. From a field of 18 entrants the winner was Mr. F. D. Byers, Mr. J. Gibson being runner-up. The next flying competition is to be held on Sunday, May 9th, and will take the form of a forced-landing competition, entries being limited to pilot members with less than 20 hours' solo flying time.

During March 269 hours were flown, there being five first solos during the month. A new Rapide has been added to the fleet and Messrs. Ayles, da Costa, and Ercolani have recently returned after delivering a new aircraft to Baghdad.

* * *

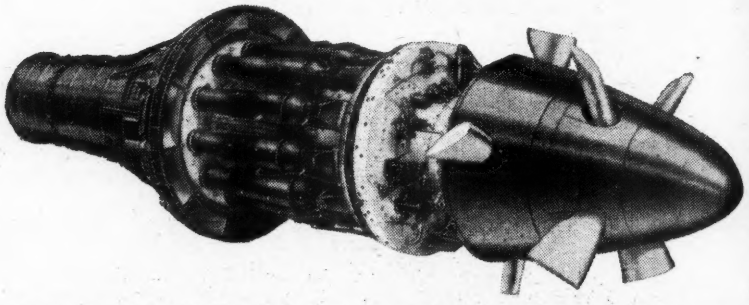
A very interesting illustrated lecture on the life of the late Col. S. F. Cody was given to members of the South Coast Flying Club by Mr. G. A. Broomfield on April 24th. Mr. Broomfield, himself a friend and helper of Cody in the early days, used the same lantern slides which Col. Cody had employed in talks describing the designing, building and flying of the first aircraft to leave the ground in Britain. Mr. Broomfield traced the life of Cody from his boyhood adventures in America, the experiments with man-lifting kites in the Army and Navy, development of Army airships and the British Army Aeroplane No. 1 which made five flights in May, 1908, these being the first recorded flights in the history of flying in Great Britain. The speaker was introduced by Captain Duncan Davis, who was Cody's first pupil. Other pioneers of aviation who were present at the lecture included Commodore May and Mr. Cecil Pashley, chief instructor of the club. Mr. Pashley has been flying continuously since 1909, and has completed over 15,000 hours. The lecture, which was wound up by Commodore May with some amusing stories of his flights with Cody, was greatly enjoyed and received with great applause



The 50 h.p. Gnome rotary engine of 1910

The Art of the Aviation Engine

First Louis Blériot Lecture Given Before A.F.I.T.A. in Paris



At the appropriate height and speed the Armstrong Siddeley Python delivers some 5,000 b.h.p.

THAT an Englishman has been accorded the distinction of presenting the first Louis Blériot lecture must be regarded as a graceful gesture and a further pointer to the *entente cordiale aéronautique* which has, for so long, spanned the Channel separating France and England.

A. Cdre. F. R. Banks, C.B., O.B.E., F.R.Ae.S., M.I.A.E., M.S.A.E., who served as Director-General of Engine Production and, later, as Director of Aero Engine Research and Development in the Ministry of Aircraft Production during the recent war, said in the introduction to his lecture that he was deeply appreciative of the honour done him, and expressed the hope that his will initiate a long list of lectures honouring that great man of French aviation whose name has been given to the series. This was the second occasion upon which the author had been invited to deliver an address to the Association Française des Ingénieurs et Techniciens de l'Aéronautique and it was with great pleasure that he was able again to meet his French friends.

Previous papers by the author and others have dealt with the working principles and specialist problems of the aviation engine, but no one had as yet described how this type of engine is conceived and developed to the state of series production, nor has it been understood why some manufacturers are more successful than others in this respect. When, however, he was asked by the Association to present another paper, the lecturer decided that, in view of the importance of the occasion, the time had arrived to describe the evolution of the aviation engine.

Power, Volume and Weight

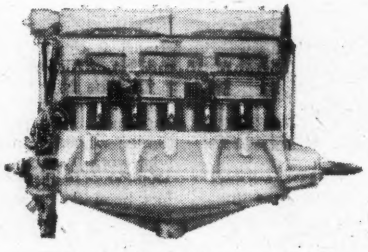
A particular feature which distinguishes the aviation engine from all other forms of prime mover is that it must meet a stringent weight limitation and, at the same time, produce high power from small volume. Another important difference is the relative lack of finality in aviation: the demands made upon the aero engine have always been exacting and are not likely to be any easier in the future. This is particularly true at the present time of the aviation gas turbine —an entirely new form of prime mover now in its infancy which must be subjected to the same intensive development as the piston engine before it can be considered to have attained the equivalent state of refinement.

The term "life" is difficult to define because, at each period of overhaul or revision, the engine will be brought to its original standard of quality by any replacements which are necessary. The operating life of an individual air line engine is likely to vary from 3,000 to 12,000 hours before the engine is discarded. Some of the more moderate duty types of American engine of about 30 litres capacity, which have been in air line service for over ten years, have achieved a total working life per engine as high as 20,000 hours. The utilization factor, which represents the useful running time per year for an engine or an aircraft, including overhauls or revisions, will average about 3,000 hours.

The lecturer then went on to give some comparisons between the lives of aero engines and steam and diesel railway locomotives and demonstrated that there was surprising parity in many respects.

After reviewing the birth and development of the aviation engine, A. Cdre. Banks observed that, in a period of more than forty years of aviation, the power of the individual engine has increased from 35 h.p. to more than 3,500 h.p. And the altitude at which sea level power can now be maintained has risen from sea level to greater than 10,000 metres.

The aviation engine industry, which was born in the first world war, is unique as an industry because it flourishes mainly as the result of national support. This is distinct from nationalization, with which it should not be confused. Unlike the traditional armament business, the aviation engine industry has useful application in peace, but it enjoys government support because of the military potentialities of the aircraft.



The six-cylinder Siddeley Puma of 1916.

It is not usually appreciated how few active aviation engine companies there are in the world today. The total number of firms manufacturing high-duty engines barely exceeds fifteen, excluding Russia, Germany and Japan, and the number of really active firms who are building successful engines today can almost be counted on the fingers of one hand.

Specific Problems

Turning then to a review of some of the specific problems encountered in the creation of a successful aero engine, the lecturer pointed out that, important as was liaison between the technical (design and experimental) sections and the production department, it is essential that the technical people must have the final decision in the case of any argument between them and the production department as to the suitability for production of the design of the engine or its components.

Experience has shown that the time taken to design, develop and get the first or "Mark I" version of a prototype piston engine into production is between four and five years. In the present state of knowledge this also holds true for the airscrew turbine, and even the turbo-jet with an axial compressor will take little less time to develop.

A. Cdre. Banks devoted some time to a survey of the system of contracts and official ordering of engines in this country, and then went on to consider the organization and working capacity of a typical aircraft engine firm. On the subject of design and development, he observed that, in the case of the piston engine in the recent war, the most economical British engine built, in terms of manufacturing or man-hours, was the 12-cylinder, 60 deg V, liquid-cooled, poppet valve type. The next in order of merit was the sleeve-valve radial engine of about the same maximum power, whilst the engine requiring the greatest number of man-hours in its manufacture

1948 AIRFIELD FIRE PROTECTION

Pyrene TRADE MARK

AIRFIELD CRASH TENDER

Crash Tenders as illustrated have already been chosen for airfields at Jersey, Colombo, Basra, Brussels, Accra and Karachi.

When aircraft crash on landing—fire in its most violent form must be expected—fire that threatens and imprisons the crew and passengers—flames that can only be controlled by the application of specialised fire fighting media in the shortest possible time.

The "PYRENE" Airfield Crash Tender—a new departure in specialised fire fighting—combines mobility and tractability with an extremely high Foam and CO_2 output.

Built on a Bedford "Q.L.4." (four-wheel drive) chassis with high ground clearance which is capable of rapid movement over rough or soft ground. It carries 40 gallons of "PYRENE" Foam Compound and 500 gallons of water which, through the medium of "PYRENE" Mechanical Foam Generators, produce 2,500 gallons of foam per minute for approximately 1 1/3rd minutes. In addition, this vehicle is fitted with 6-50 lb. CO_2 gas cylinders connected through a manifold to two hose reels, terminating in fibre gas distributors. The output is 1,600 cu. ft. of CO_2 gas per minute for approximately 1 1/3rd minutes.

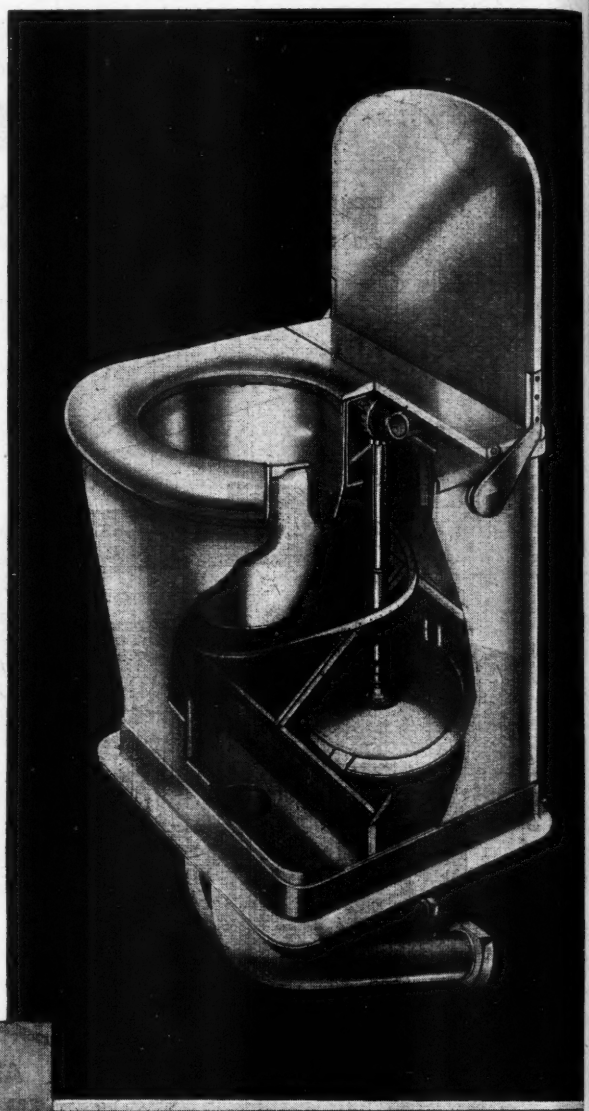
This Crash Tender is designed to provide maximum visibility, ease of control and rapid action. The Coventry-Climax Fire Pump fitted within the Tender delivers 380/400 G.P.M. of water-Foam Compound solution at 150 lbs. pressure per square inch. This pump can be brought into action en route to the scene of the fire enabling Foam to be produced as soon as the hoses are run out.

Full particulars and specification will be given on application.

Write to The Sales and Service Department :-

THE PYRENE COMPANY LIMITED

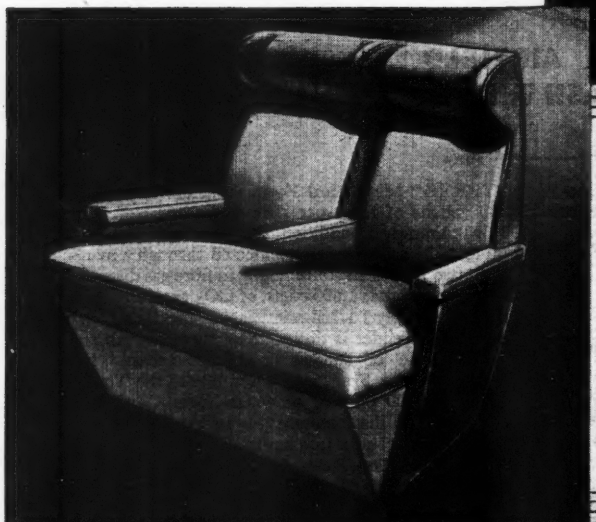
9, Grosvenor Gardens, London, S.W.1. England. Cables "Pyrene London" 'Phone: Victoria 3401/2



The new Self-Flushing Lavatory designed for all types of passenger carrying aircraft.

The Aircraft Chair designed for the Armstrong Whitworth Apollo, is of light weight and robust construction and particularly suitable for circular fuselages.

These items are recent products of the Aircraft Division of A.S.T. and are additional to the many other items of aircraft equipment being produced, including Electric Water Heaters, Ice Boxes, Ceiling Lights and Kitchen equipment.



HAWKER SIDDELEY GROUP

A Branch of the Hawker Siddeley Group

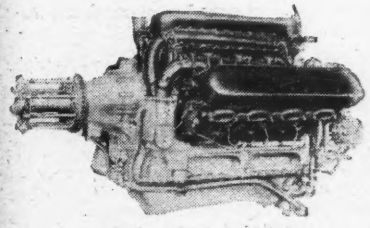
AIR SERVICE TRAINING LTD · HAMBLE · SOUTHAMPTON

The Art of the Aviation Engine . . . . .

was the 24-cylinder, opposed type, liquid-cooled, sleeve-valve engine with two crankshafts. The actual manufacturing times for each of these three types was of the order of 3,000, 3,300 and 6,500 man-hours respectively, at a production rate per factory of 400 to 500 engines per month.

There is one very important factor which is not often appreciated. This concerns the ability and capacity of a firm to develop engines intensively. In other words, when buying an engine, it is power and performance which are actually being purchased; and the firm most active in the technique of development will produce better performance from an engine of given size and weight than another firm which may offer only the same performance from an engine of, say, 25 per cent larger capacity. Intensive development, however, always pays and finally leads to the production of engines of lower cost.

The Whittle-type jet turbine, with a double-sided single-stage compressor and



In service for many years from 1919, the 450 h.p. Napier Lion.

a single-stage turbine giving a static sea-level thrust of 5,000lb, requires somewhat less manufacturing or man-hours than a 60 deg V-type, 12-cylinder, liquid-cooled engine of about 2,500 h.p. take-off rating. But the jet turbine costs considerably more per pound of structure weight than the piston engine.

Man-hours involved in the design and manufacture of a prototype airscrew turbine with an axial compressor are from 10 to 15 per cent greater than those needed for a large 24-cylinder, twin-crankshaft, liquid-cooled, sleeve-valve piston-engine, assuming the same maximum power for both engines to be of the 3,500 h.p. order.

Cost of a prototype engine varies somewhat with its size or maximum power, and complexity, but is between £10 and £20 per pound of structure weight. As an example, a large liquid-cooled engine of 3,500 h.p. which weighs 3,700 lb, will cost about £15 a pound, or £55,000. An airscrew turbine of about the same maximum power will weigh much less but will absorb more design hours and cost more per pound to manufacture in prototype form. Therefore, the total cost will be of the same order as that of the equivalent piston engine, assuming a weight of 29,000 lb at £20 per pound, or £58,000.

The lecturer said that he had frequently been asked what he considered should be the average number of engine hours run per year in developing a prototype engine and, in this connection, stated that the total running time on the test bed and in flight before the first "Mark" of a prototype engine is ready for type test will be 5,000 or 6,000 engine-hours in a period of three to three and a half years, involving about ten engines.

Equipment required for calibrating and testing the components of a gas turbine is far more elaborate and expensive than any used for piston engines. In the past three or four years, equipment has been installed at some of the British and American firms which runs into hundreds of thousands of pounds sterling and tens of millions of dollars. In some cases, the equipment was supplied at government expense, but one or two firms provided comprehensive equipment at their own cost. A. Cdre. Banks then made the trenchant observation that air, in the quantity and condition required for testing gas turbines, is a very expensive commodity.

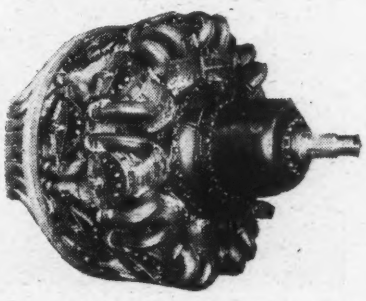
He then went on to say that, in order to test complete and full-scale jet engines at conditions of altitude and temperature simulating 11,000 metres (tropopause) and minus 60 deg C, the cost of the test plant is equivalent to £20,000 for every pound of air per second capacity provided for the engine. For instance, if an engine can consume, say, fifteen pounds of air per second at 11,000 metres, the total cost of the plant will be in the order of £300,000.

Subsidized Research

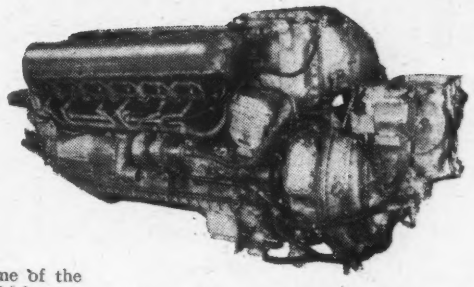
The lecturer gave it as his opinion that the best and only practical way to help the aviation engine industry is for a government to provide its research establishment with the more expensive and elaborate facilities, such as the high-altitude test tunnel and compressor and turbine test houses with an available power of, say, 40,000 h.p. Aerodynamic test equipment for investigating blade forms, etc., must be provided and, also, comprehensive facilities for combustion research. Some of this equipment already exists in the research establishments and in the firms, both in Great Britain and America. But America has the most complete research and testing facilities for gas turbines in the world.

Chief among the points made by the lecturer in his summing-up were that:

(a) If successful aviation engines are to be built, the industry must have properly controlled government support in the form of sound technical requirements, followed by orders. The industry should not be nationalized because of its highly competitive nature and the fact



The present-day Bristol Centaurus which produces 2,700 h.p.



The Rolls-Royce Merlin which first powered our 8-gun fighters in 1936 and is still in service. The Merlin 130 is shown.

that, in times of peace, manufacturing licences and engines are sold to other countries who may prefer to deal direct with the firm, or firms. These countries may also have a government-supported aviation engine industry which would resent competition with one that was government controlled, or nationalized.

(b) Engines should always be built to meet specific aircraft requirements and, therefore, very good liaison with the aircraft manufacturer and his designer is essential. There must be mutual trust and confidence in each other's products. But it is more important that the engine manufacturer enjoys the full confidence of the aircraft builder.

(c) Very heavy expenditure is involved when providing complete development and testing facilities for gas turbine components; much heavier than that required for the equivalent facilities for a piston engine. Between £2,000,000 and £3,000,000 would be necessary to manufacture and install the equipment. Some firms prefer to be independent of the government in regard to capital expenditure and provide their own, less elaborate, equipment. Others pay for the buildings (test houses) and also own the land upon which these stand, but ask the government to provide the experimental equipment installed, on the basis that this equipment may be rendered quickly obsolete.

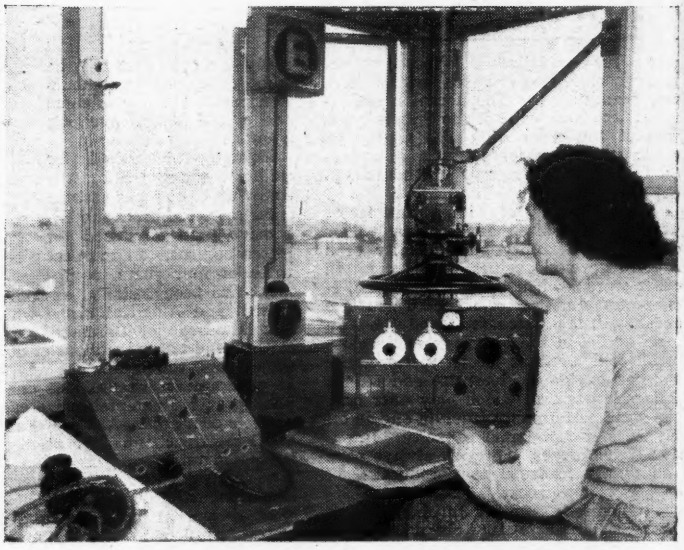
(d) More time is at present required (between 10 and 20 per cent.) to design and manufacture a prototype airscrew turbine of the axial compressor type, ready for test, than that required for a piston engine of equivalent power. Even a small airscrew turbine with a two-stage centrifugal compressor exceeds in total design hours, the time taken to design the more conventional piston engine of somewhat greater power. The most economical engine in terms of design and manufacturing hours, is the classic Whittle-type jet turbine, which absorbs about one quarter of the design hours of a large airscrew turbine.

(e) The life of a piston engine, as a type, has been about ten years, sometimes more, before becoming obsolete. During this time, its performance will have been much improved by continuous development. This is important, since it takes five years to create an engine and it would not be very economical to design and develop an entirely new engine whenever an increase in performance was required. This also applies to the gas turbine but it is unlikely that there will be the same large percentage increases in power which have

(*Concluded on page* 534)

Keeping in Touch

New British Two-channel VHF Equipment for Light Aircraft



The Southend control tower, showing the R/T remote control panel at left and the D.F. equipment in the corner.

IN the autumn of last year a member of the Southend Municipal Flying Club had flown over to the Herts and Essex Club at Broxbourne for tea and, during his return flight, a sea mist came up in about ten minutes and completely obscured his home airfield. The mist was no more than about 300ft thick, but in the airfield control tower they were getting very worried at hearing the Auster flying around overhead, knowing that the pilot was relatively inexperienced and, of course, being quite powerless to give him any directions. The pilot attempted a let-down through the mist and flew into a ploughed field: luckily he and his two passengers walked away from the aircraft without injury, although the machine was severely damaged.

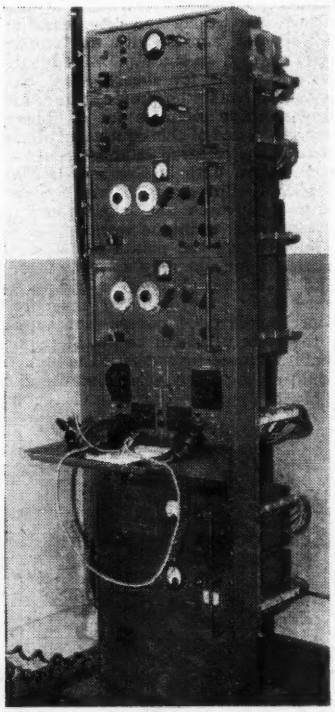
Mr. Bernard Collins, airport manager, reflected that, had he only been able to communicate with the Auster, he could have informed the pilot that Rochester and West Malling, on the other side of the Estuary, were quite clear and the whole contretemps could have been avoided. Unlike most people, he decided to do something about it and forthwith put up a proposition to the municipal authorities which was confirmed in the December council. He next approached E. K. Cole, Ltd., makers of Ekco radio equipment, and, on the 5th January this year, visited the Ministry of Civil Aviation with Ekco representatives. The M.C.A. were extremely helpful and gave their blessing to the scheme propounded. Briefly, this was that a simple VHF two-channel, R/T communication system should be produced by Ekco and installed at Southend Airport and in the Club machines. With nothing to bar the way, E. K. Cole, Ltd. got on with the job, and the equipment they specially designed and manufactured for this purpose was installed and started operating on the 1st of April, that is, under three months after the initial suggestion.

The ground equipment is neatly mounted in a standard R.A.F.-type rack and comprises two crystal-controlled VHF transmitters, two crystal high-gain receivers, a control panel and two power units. The overall measurements of this installation are, 6ft high, 1ft 9in wide and 1ft 3in deep. Of the two transmitting and receiving channels, one is normally set to the civil aviation guard frequency of 118.1 Mc/s, whilst the other would usually be set to the particular frequency alloted to the local aerodrome, that is to say, any frequency within the 118 to 128 Mc/s band. The transmitters and receivers of the ground equipment are operated from mains supply (200-250 volts), the transmitter aerial power output being approximately 5 watts, whilst the receiver sensitivity is of the order of 2 microvolts.

This equipment may be installed either in the control tower itself or at some convenient position nearby, and remote control facilities can be provided if required, so that control of either channel may be taken over immediately at the rack or remote end. Intercomm. facilities between the control tower and rack equipment are, of course, available.

For installation in the aircraft, Ekco have produced a very compact transmitter/receiver unit—it measures 13in×6in×4¼in—and weighs no more than 12 lb. The remainder of the aircraft installation consists of a small control unit (½ lb), a junction box (½ lb), and a mounting tray (1 lb), together with a simple whip-type aerial and, of course, microphones and head-sets and the requisite screened cable. As our photograph shows, the unit fits quite neatly in the rear corner of an Auster cabin. The set contains sixteen valves plus rectifier and is divided into two crystal multiplier chains, two RF and frequency-changing chains, and a common IF, detector, LF and modulator chain.

The control unit has a neat little panel which can be installed in the instrument board, or in any other convenient place. Switches could scarcely be more simple in being confined simply to an ON/OFF switch, a channel selection switch and a SEND/RECEIVE switch: it is possible that the last mentioned will take the form of a simple "press-to-speak" switch mounted on the control column, if this is felt to be desirable.

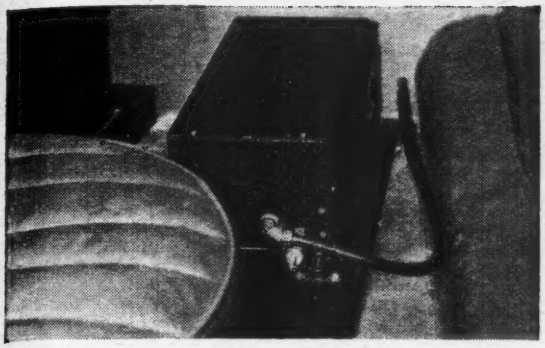


Rack of transmitter/receiver units, with control panel, and, below shelf, the two power units.

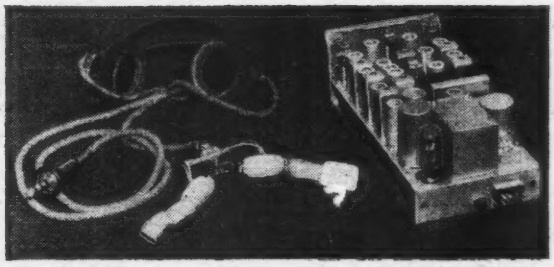
Standard intercomm.-type plug-and-socket units are used for the microphone and head-set connections and, because the noise level in the cabin of the average light aircraft cannot well be considered as low, throat-type microphones are at present in use: these are not uncomfortable to wear and, of course, have the additional advantage that they do leave one's hands free. Intercomm. facilities are also available with the equipment which, in consideration of the noise question previously mentioned, does facilitate ease of conversation between the aircraft's occupants.

The two-way range of the equipment will, of course, vary with the topographical character of the locality and transmitter power, but some indication (which the manufacturers agree is conservative) is given by the following range/altitude values:—At 500ft, 20 miles; at 1,000ft, 24 miles; at 2,000ft, 33 miles; at 5,000ft, 45 miles; and at 10,000ft, 66 miles.

As an additional refinement for use in conjunction with the communication equipment so far described, Ekco have also developed a complete direction-finding installation. This has been especially designed for simplicity and accuracy and may be tuned immediately and automatically to either of two crystal-controlled frequencies for homing aid and also to give a precise null indication of an incoming signal. The DF receiver employs a pair of di-pole aerials which are operated



The airborne transmitter/receiver unit is conveniently carried in the port rear corner of an Auster Autocrat.



Airborne set, minus cover, and headphones, throat microphones, and connector plug.

manually in conjunction with a calibrated scale. Sense is obtained by aural procedure, using headphones or a meter indicator, together with a press-button control switch.

Delivery of the equipment is promised by the makers in approximately three months from the date of order and their own engineering department will undertake the initial installation. The prices quoted are as follows: For the aircraft equipment, £95; the VHF ground equipment, £475; and for the DF, £175, all excluding installation.

A point which Mr. Collins made is that coverage of the whole of England could be obtained by installing this equipment at not many more than half a dozen airfields, at a cost of approximately £10,000. This would seem to us to be a very small price to pay for the tremendous effect in promoting the safety of light aircraft operation.

NEW H.P. SECRETARY

AN appointment which will be popular not only within the firm but in aviation circles generally is that of Mr. G. C. D. Russell to the post of secretary of Handley Page, Ltd.

Mr. Russell has spent his whole technical career in aviation, starting as an apprentice at Cricklewood some 30 years ago, and gradually working through all the different departments. He took no small share in developing the Handley Page slot, at a time when he was in charge of the wind tunnel, and has done equally good work in many other directions. For several years he has been personal assistant to Sir Frederick Handley Page, and whatever his work at any time, he has maintained a keen interest in the apprentices, whose welfare and training have been very close to his heart. We wish Mr. Russell all good fortune in his new post.

Mr. G. C. D. Russell

HAWKER SIDDELEY MOVE

FROM May 20th the address of the Sales Co-ordination Department of the Hawker Siddeley Aircraft Co., Ltd., and the editorial offices of the *Hawker Siddeley Review* will be 18, St. James's Square, S.W.1.

SPREADING THE LIGHT

A NEW brochure, designated A 165, recently issued by Philips Electrical Company, gives detailed particulars about industrial light fittings for tungsten lamps. Information is given on concentrating, dispersive and diffuser type fittings and also a new-type elliptical-angle reflector for providing side and vertical surface illumination. Zone diagrams of light distribution are also included in addition to details of forms of suspension.

INTERNATIONAL GLIDING CONTESTS

FOUR of the pilots have been selected for the British team to take part in the 1948 F.A.I. International Gliding Competitions at Samaden, and two further pilots, selected from B.A.F.O. will be added to the list. Mrs. Ann Douglas will be captain and team manager. Among the team's pilots Mr. Philip Wills will need no introduction, and Messrs. Charles Wingfield, Christopher Nicholson and Lorne Welch will be well known to those who attended the international meeting at Bramcote last year, or who visit Redhill.

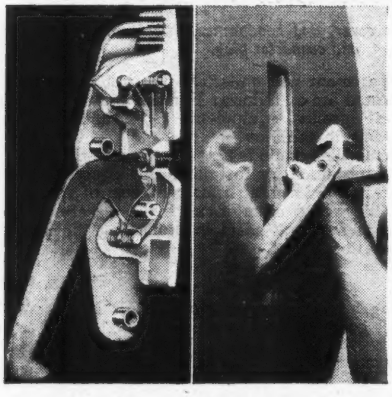
The team will take to Switzerland two new British sailplanes, Slingsby Gull IVs, the handling and speed characteristics of which are particularly good, two Olympia Eons, two Meises, and a Weihe as a reserve machine. All will be equipped to carry oxygen for high-altitude flying.

Due to the generosity of certain companies and owners the cost of taking a team to compete in the international contests has been reduced by about half. Slingsby Sailplanes, Ltd., of Kirbymoorside, Yorks, have provided two fully equipped Gull IV sailplanes (£1,700); Elliots of Newbury, Ltd., one fully equipped Olympia Eon and trailer (£850); Mr. Philip Wills one Weihe trailer and tow-car (£1,850); Rice Trailers one trailer (£200); and the Rover car company, four Landrovers (£1,800). The operating costs of cars, trailers and sailplanes, and the expenses of the team will involve expenses of at least another £1,500, which is more than members of the team, who are already paying all their own training costs, can be expected to bear. Help has been received from the Royal Aero Club and the de Havilland company, but contributions towards expenses in cash or kind would still be very welcome.

Members of the British gliding team for the Samaden competitions are (left to right) Charles J. Wingfield, Phillip A. Wills, Christopher Nicholson, Mrs. Ann Douglas and Lorne Welch. Two B.A.F.O. pilots have still to be selected.

Napier Cowling Fastener

THE demand for a quick-release cowling fastener which could be operated with ease and speed to facilitate the rapid removal and replacement of cowling panels led to the production of the Napier toggle fastener. The cowling fastener of the German Fw190 aircraft was, from a maintenance point of view, very successful and the embodiment of this type of fastener, which worked on the toggle principle, was extended to many other types of enemy aircraft during the war. Two disadvantages, however, which the Napier designers sought to overcome were that since the German product was in halves, each being fitted to adjacent cowling panels, the failure of one fastener allowed two panels to come adrift; furthermore, the mating halves of the fastener, being located on separate panels, necessitated great accuracy in the centre to centre dimensions between fasteners if interchangeability was to be ensured.



Internal and external views of the Napier cowling fastener, showing the mechanism and the method of release.

It was therefore obvious that, if these two disadvantages were to be overcome, a type of fastener would have to be evolved which would enable each panel to be independently attached to the basic aircraft structure, and also that the fasteners themselves would have to be located on one panel only. After discarding a number of schemes, an arrangement was produced which showed promise and the new type of fastener was fitted for testing on a new installation of the Napier Sabre engine in which some panels were hinged and others completely detachable.

Experience over an extended period has proved this fastener to be effective, and in one instance after an aircraft had made a wheels-up landing it was found possible to remove the complete power plant and install it in another airframe without any alterations or adjustments being necessary to the panels or fasteners.

Following numerous inquiries from the aircraft industry for small quantities for testing and prototype purposes the fastener was re-designed to embody some minor improvements which experience indicated as being desirable, and tooling for quantity production was put in hand. There are indications that a large proportion of the prototype aircraft to be produced during the next few years will be fitted with the Napier toggle fastener.

WORKSHOP ASDIC

SURFACE finish is a quantity which in the past few years has assumed increasing importance, and although a variety of elaborate equipment for the measurement of surface finish is in general use, it is confined to the laboratory. Now, a simple means of determining surface finish, quite suited to normal workshop use, has been announced by the Capac Company, Ltd., 2, Ullswater Road, London, S.W.13.

The device is particularly interesting in that it makes use of the stethoscopic principle. The application for test consists of a "Tectoscope" fitted with a special test rod ending in a hardened steel ball of ¼in diameter. This is applied with a stroking movement to the surface, the stroking being made at right angles to the direction of the grinding or other finishing process, so as to ensure that the ball passes over the crests of the surface variations.

It is stated that the variation in sound between a ground surface and a lapped "mirror" finish (that is, from 20 micro-inches to 6 micro-inches) is very considerable and distinctive, but, if desired, reference can be made to a separate piece selected as a standard in order to determine relative roughness in checking production items. The price of the equipment complete in a case is given as £10 10s.

A tabulation of sounds is quoted for respective finishes as follows:—

Material	*Sound similarity*
Fine sand casting	Sifted rocks
Fine file finish	Sifted gravel
Aluminium sheet	Sifted sand
Polished nickel silver	Sifted earth
Glass sheet	Low hiss to harsh squeak

The Art of the Aviation Engine

(Concluded from page 531)

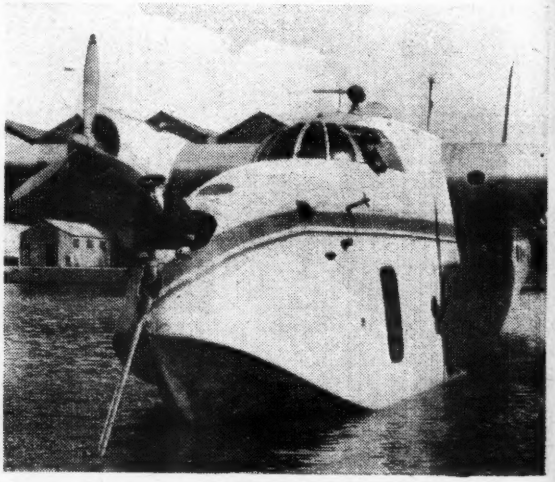
been characteristic of the piston engine in the last twenty years. The gas turbine is virtually a "full throttle" engine and, therefore, the more that is learned on compressor, combustion and turbine behaviour, the greater is the possibility of the prototype engine quickly giving its designed power in development and the less likelihood of much increase during the life of the engine.

(f) There is no substitute for operating an engine in actual flight conditions and until the gas turbine, particularly the airscrew turbine, has had many thousands of engine-hours in the air, little will be known of its practical possibilities and running economy.

The gas turbine has suffered more than any other engine from irresponsible publicity and changing requirements, largely because of the mistaken idea that it can be designed and developed quickly. The result is that gas turbines have been created on the drawing board and, as quickly, discarded for other creations on paper. There has already been a recession and some aircraft which were to have airscrew turbines are threatened with extinction or, at least, a reduction to the basis of one or two prototypes only. This is in part due to the vacillating policy, or lack of any policy, of those in control of civil aviation and, also, weakness on the part of the air line operators, mainly on the grounds of inadequate airport facilities for landing such aircraft and the absence of proper flight control en route. But these deficiencies also apply, in a lesser degree, to present-day aircraft with cruising speeds in the region of 300 km/hr only, and are unlikely to be improved unless the pace is forced by those determined to operate advanced aircraft types

TRANSATLANTIC VAMPIRES

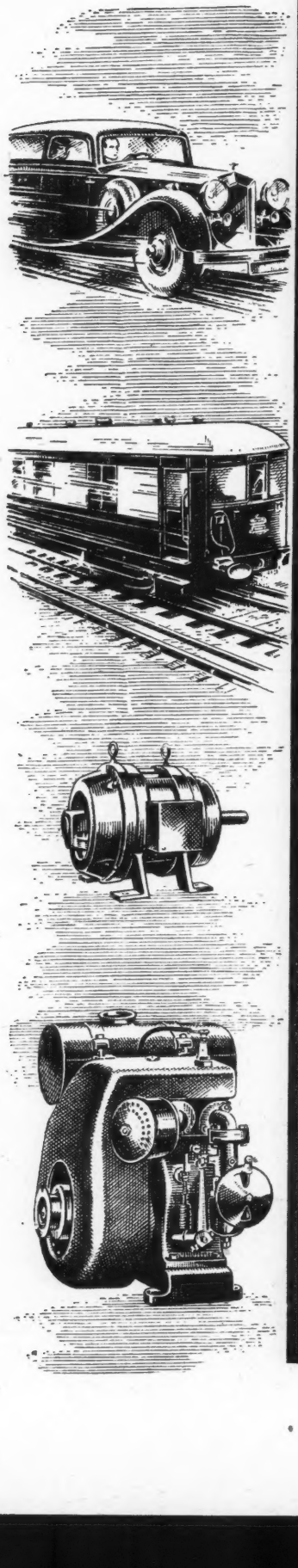
A SQUADRON of R.A.F. Vampires will leave during August on a flight to America by way of Greenland and Iceland. Demonstrations will be given at the principal cities and at military airfields.



OFF THE BUOY: A D.N.L. crew taking away the fourth Sandringham VI built by Short Bros. and Harland Ltd. for Norway.

A branch of metallurgical science of great importance today is the study and manufacture of materials able to resist high temperatures. Most of the successful metals, of which Inconel and the Nimonic series of alloys are famous examples, contain nickel. Where your engineering problems involve high stresses and high temperatures ask for the advice of the pioneers in the manufacture of these nickel-containing materials,

Henry Wiggin & Company Ltd., Wiggin Street, Birmingham, 16.



LTD

VANDERVELL

THIN WALL

BEARINGS

FOR EVERY

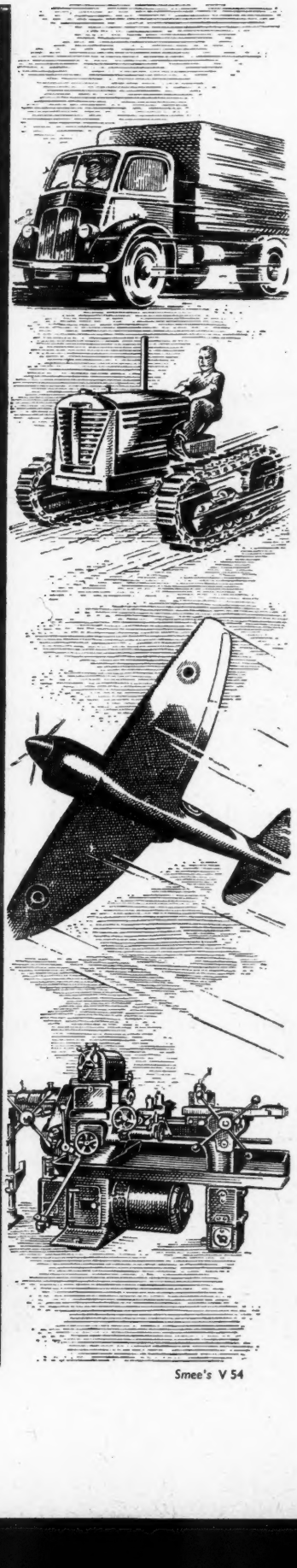
PURPOSE

VANDERVELL

PRODUCTS LTD

WESTERN AVENUE · PARK ROYAL

LONDON, W.3.



Smee's V 54

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

FACTORS OF SAFETY
Effect of Gravitational Variation

I SHOULD be interested if any designer of aircraft would express an opinion on the possible effect of the total weight of an aircraft travelling from the Equator to the Pole increasing (1 part in 194 parts), the rate of increase being as the square of the sine of the latitude. Further, it would be very interesting to ascertain if any vital component part would have its factor of safety jeopardized by such increases in weight.

The views of any of your readers would be greatly appreciated in the interest of increasing the factor of safety of aerial travel.

W. REGINALD DAINTY,
Hon. Capt., R.A.F. (R.N.).

Brighton, Sussex.

THE R.A.F.V.R.
Training Position Cleared Up

HAVING read Mr. Macbride's letter in *Flight* of April 29th, I am very pleased to find the conditions of service laid down for the R.A.F.V.R. so explanatory; now we all know how we stand. I, for one, find it most satisfactory that we get our full pay if we split up our training. This should give great encouragement to those types who have been wondering how to fit in the 15 days' training.

I hope my own letter in the same issue has not done injustice to the R.A.F.V.R. My own particular unit took a poor view of it, and I tender my very sincere apologies. I feel, however, that I had a definite complaint, and am very pleased the Air Ministry also agree and now grant us full pay.

No doubt they have had numerous complaints on this subject, so I will express my thanks on my own behalf and that of others for the very prompt way those concerned dealt with this matter for us.

"NO LONGER QUITE SO BROKE."

Cambridge.

ULTRA-LIGHT AERO ENGINES
Good Progress Already Being Made

I WAS interested in the letter from Mr. A. G.-J. Brown in your issue of May 6th, on the need for a very light aero engine to provide economical flying in single-seat aircraft. The Ultra Light Aircraft Association was formed 18 months ago with the aim of encouraging the development of ultra-light aircraft and so bring the sport of flying within the means of thousands who cannot possibly afford the present high charges at the clubs. We quickly realized that no engine constructor would risk the cost of designing an engine and tooling up for production unless assured of an aircraft market. Conversely, no aircraft constructor would design an ultra-light aircraft until an engine was available!

Fortunately, however, with the help of a loan from the Kemsley Fund we were able to break the stalemate by purchasing a quantity of surplus Aeronca J.A.P. engines, which are now being prepared for sale to our members at a very moderate cost. These are flat-twin engines of 37 h.p., which have been type approved by A.R.B. and are very reliable, if somewhat heavy.

The purchase of these engines resulted in considerable activity in the aircraft field, nine design projects being now in hand, two of which are already undergoing their C. of A. flight trials. Judging by the rapid growth of our membership, a considerable market for these aircraft both at home and overseas is likely to develop within the next few years.

Although the J.A.P. engines should tide us over for this year, we realised the need to arrange the production of a more modern engine for the future. Consequently we drew up a detailed specification of our requirements which has been approved by A.R.B., who have agreed to a considerable reduction in the severity of their type test for engines to be installed in ultra-light aircraft having a stalling speed not exceeding 40 m.p.h.

The design of an engine of 40-50 h.p. is now well in hand by one of the best known motor cycle engine designers, and incorporates certain ingenious features to ensure simplicity, reliability and cheapness. The designer has been public spirited enough to undertake the production of a few prototype engines for trial by us, but subsequent production arrangements have not yet been planned.

Mr. R. C. Cross, head of the Cross Manufacturing Co., Ltd., is designing a 1½-litre, 3-cylinder radial engine of 45-55 h.p. ungeared, with an alternative geared version of 60-74 h.p. This incorporates his interesting rotary valves which have been extensively developed and proved on motor cycle engines. The engine has remarkable possibilities, but its production must await a development contract.

Major W. A. Weaver, head of the Coventry Victor Motor Co., Ltd., has agreed to convert two of his 850 c.c. "N"-type flat-twin engines for flight trials. These are well proved, robust and remarkably smooth little motors which should be highly suitable for motor-gliders. Being already tooled up in production, they should be readily available and their cost should be low.

We can, therefore, claim that the U.L.A. engine design position is promising, but production arrangements must depend upon Government support or some public-spirited patron. As we consider that the development of cheap flying is in the national interest, we would be glad to receive suggestions in the matter from any of your readers interested.

E. L. MOLE, Group Captain,
Chairman, Design Sub-Committee,
Ultra Light Aircraft Association.

London, W.1.

R.A.F.V.R. EQUIPMENT
Merits of the Auster V

MIGHT I add to the number of letters already printed in your correspondence column on the subject of the R.A.F.V.R., particularly with regard to the aircraft used. No one will disagree on the merits of the Tiger Moth as an *ab initio* training machine, but at the moment all reservists are trained pilots and require to "keep their hands in" at more than plain flying and aerobatics. How about R/T., wireless aids, gunnery, bombing, photography, etc.? Then again, most Service pilots are used to closed cockpits and at this stage expect a little more comfortable and weatherproof aircraft than the Tiger.

Surely in the Lycoming-engined Auster V (or better still, the Gipsy-engined version) we have a well-tried, sturdy and easily maintained, fairly modern cabin light aircraft, already existing in sufficient quantity to provide a fair number to each V.R school operating. This aircraft, with its enclosed cabin, full blind-flying panel, full N/F. equipment, flaps, brakes, steerable tailwheel, etc., would, I'm sure, prove more of an attraction to pilots, especially as it has numerous possible developments, i.e., fitting a camera gun for practising air/air and air/ground gunnery; light bomb racks (65 lb practice) for shallow dive bombing; camera for various types of photography; lightweight radio sets for navigation and landing aids, and so on. Should this be possible, we would have a reserve force with a good all-round knowledge of most types of Service equipment and procedure that would reduce their training time considerably, if ever required to become fully operational due to a national crisis.

"717."

Alloa, Scotland.

FORTHCOMING EVENTS

May 17th.—Cannes International Air Rally.
May 19th to 28th.—Engineering and Industrial Equipment (Home and Export) Exhibition.
May 19th—Aircraft Recognition Society: "Aircraft Photography." John Yoxall.
May 21st.—Institute of Navigation: "Meteorology in Aviation: Is it Obsolete?" Francis Chichester.
May 22nd and 23rd.—Shannon Aero Club Rally.
May 24th to 29th.—Aircraft Exhibition Cardiff.
May 27th.—Royal Aeronautical Society: Wilbur Wright Memorial Lecture. A. Gouge, B.Sc., F.R.Ae.S.
May 29th and 30th.—Netherlands Aero Club Invitation Rally, Ypenburg, Holland.
May 29th and 30th.—Butlin's Week-end Air Rally. Speeton, Filey, Yorks.
June 5th.—Cardiff Air Display.
June 12th.—Wolverhampton Aero Club "At Home."
June 12th and 13th.—Butlin's Week-end Air Rally at Ingoldmells, Skegness.
June 13th.—Henri Bardel Cup for model aircraft with mechanical motors.
June 19th to 21st.—Royal Aero Club Week-end for Foreign Guests, London.
June 26th and 27th.—Butlin's Week-end Air Rally. Broom Hall, Pwllheli, N. Wales.
July 3rd to 5th.—Private Air Rally for members and associate members of the Royal Aero Club at Deauville, France. (Guests of M. F. André.)
July 3rd.—R.Ae.S. (Glasgow): Visit to Blackburn Aircraft Ltd., Dumbarton.

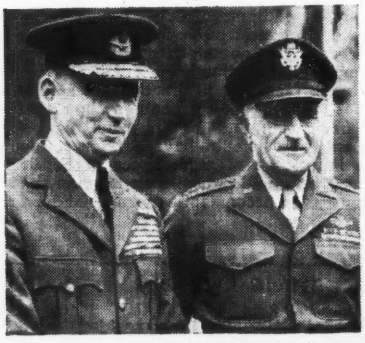
SERVICE AVIATION

GENTLY DOES IT : Though power folding has been applied experimentally to the Fairey Firefly IV and V, standard aircraft of this type, as shown, have manual folding. The scene is the Fairey airfield at White Waltham.

Royal Air Force and Naval Aviation News and Announcements

R.A.F. in Exercise "Dawn"

NEW techniques in the art of locating and shadowing opposing naval units will be tried out by the R.A.F. off the Eastern and Northern coasts of Scotland this week, when aircraft of Bomber, Fighter and Coastal Commands join with ships and aircraft of the Royal Navy in the biggest combined exercise since 1939 —Exercise "Dawn."



HIGH-LEVEL REUNION : Marshal of the R.A.F. Lord Tedder greeted his old friend General Carl Spaatz, war-time chief of the U.S. Air Forces in Gt. Britain, when this most welcome visitor arrived at Northolt on May 2nd.

The opposing naval forces are known to be considerable, and one force will include a carrier air group led by the 23,000-ton aircraft carrier *Implacable*, protected by a destroyer screen. With such a formidable force in the area, aircrews will be briefed to shadow as unobtrusively as possible. The shadowing aircraft will operate below the "Enemy's" radar "horizon," and from a variety of bearings, in order to reduce the risk of fighter interception. Positive identification will be made by another aircraft of a different type which will be in wireless touch with the main bomber force, by then already airborne. It is also known by the naval commanders that a squadron belonging to Fighter Command, R.A.F., intends to practise a role, not previously tested by these particular aircraft, which is an all-out low-level strafing attack against a force of ships of the destroyer class.

The ships were to sail from Rosyth on May 12 and, when about 100 miles out from the Forth, Lincolns of Bomber Command, escorted by a squadron of Hornets belonging to No. 12 Group, Fighter Command, will stage the first air attack. The manœuvres will continue through the night of the 13th-14th, when, as the action moves towards the Norwegian coast, submarines will join in the fray, and finally Sunderlands and Lancasters of Coastal Command, R.A.F., will deal with the submarine force.

Air Staff Conference

MARSHAL of the Royal Air Force, Lord Tedder, the Chief of the Air Staff, opened, on April 29th, his annual conference of Commanders-in-Chief. This conference is held annually at the Air Ministry and is being attended by members of the Air Council and officers of high rank from Home and Overseas Commands of the R.A.F., and from the

ROYAL TOURNAMENT REHEARSAL : The W.A.A.F. Band, which, together with the R.A.F. Central and the A.T.C. Bands, will perform at the Royal Tournament opening at Olympia on June 10th, practises at Henlow, led by Drum Major I. Byram.

R.C.A.F., R.A.A.F., R.N.Z.A.F. and S.A.A.F.

Australian Carriers

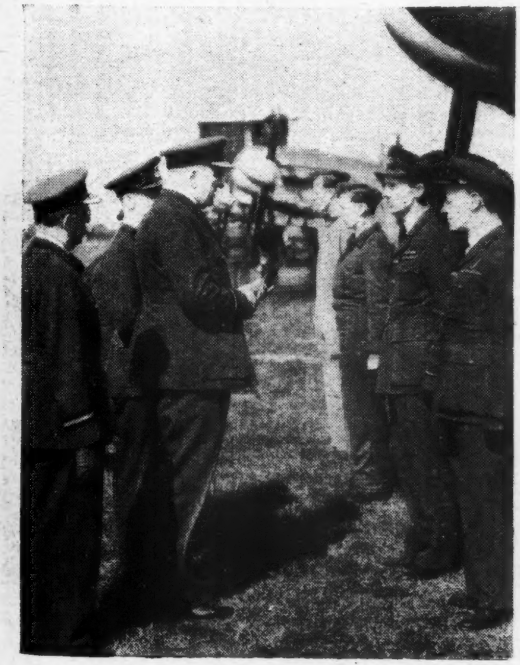
IT is announced from Canberra that the King has approved the names *Sydney* and *Melbourne* for the two British aircraft carriers to be supplied to Australia. The first is expected in Australia by the end of this year. Both will be of the *Majestic* class—light fleet carriers—and will have a displacement of 14,000 tons (18,000 tons full load). The aircraft will be Hawker Sea Fury Mk. XIs and Fairey Firefly Mk. Vs.

Training Camps for R.O.C.

TRAINING camps for the Royal Observer Corps will be organized at R.A.F. Station, Thorney Island, Hants, from September 11-25. The Corps will first engage in an important exercise with the R.A.F. Afterwards, owing to the considerable numbers involved, Observers from all over the country will assemble in three consecutive groups, from September 11-15, September 16-20 and September 21-25. Each camp will provide training facilities for more than 500 observers and their officers. These will include special lectures, inspection of modern aircraft, experience in flying and competitions in aircraft recognition.

R.A.F. Small Arms Association

S/L. C. J. COLLINS, a retired officer of the R.A.F., an eminent rifle shot and winner of the Grand Aggregate at the National meeting at Bisley in 1946, has taken over the honorary secretaryship of the Royal Air Force Small Arms Association in succession to the late S/L. J. L. K. Pearce, O.B.E., who died in Dublin recently. During the 23 years of S/L. Pearce's secretaryship, the Association progressed from small beginnings to its present eminent position among the shooting element of the R.A.F. A first-class rifle and pistol shot himself, S/L. Pearce was untiring in his efforts to encourage and instruct the beginner.



A.O.C.'s INSPECTION: Air Commodore G. H. Vasse, C.B.E., A.O.C. 63 Group stops to chat to P/O. R. Goodwin and his navigator, P/O. R. Ayling, when he visited the R.A.F. Station Honiley on April 25th and inspected personnel of 605 (County of Warwick) Squadron, R.Aux.A.F.

Exercise Pandora

THE Premier visited R.A.F. Station, Old Sarum, on May 4th, to listen to discussions arising from Exercise Pandora. Conducted by Marshal of the Royal Air Force, Lord Tedder, Chief of the Air Staff, this exercise is a study of the effect of scientific developments on modern air warfare.

605 Squadron Inspection

MEMBERS of the recently re-formed 605 (County of Warwick) Squadron R.Aux.A.F., together with personnel from 2605 Light Anti-Aircraft Squadron, R.Aux.A.F. Regiment, were inspected by Air Commodore G. H. Vasse, C.B.E., A.O.C., No. 63 Group, Reserve Command, on April 25th.

The A.O.C. spent an extremely busy day, which commenced with a parade and march-past at Honiley of personnel from the two auxiliary units. The Station Commander, S/L. Sing, D.F.C., was in charge of the parade. In the afternoon there was a formation fly-past of six of 605 Squadron's Mosquitoes. The same high standard of flying was displayed by the Squadron as on the previous afternoon, when leading a formation of four auxiliary squadrons at Ringway in connection with the Territorial Forces' Recruiting week at Manchester.

A note of regret was struck at the dining-in ceremony in the officers' mess in the evening, when it was announced by S/L. R. J. Walker, D.S.O., who has been the C.O. of 605 Squadron since it was re-formed last year, that he was resigning his appointment to take up a permanent commission in the R.A.F. The A.O.C. spoke in appreciation of S/L. Walker's work for the Squadron.

Earlier in the evening Air Commodore J. A. C. Wright, Honorary Commodore of 605, related the story how the Squadron came to adopt the crest of the bear and ragged staff. He claimed it was the first squadron in the whole R.A.F. to have its own crest. Permission, he said, was obtained from the Earl of Warwick for his family crest to be used. This consisted of a muzzled bear and a ragged staff, and it had appeared as such until shortly before the war. Recently, however, he had noticed that the bear was no longer muzzled, and he could give no explanation why this was so other than the fact that the Squadron which was originally a bomber unit was now a fighter squadron.

As a result of Air Commodore Wright's comments, members of the Squadron are now looking through the Squadron archives to try to solve the "puzzle of the missing muzzle."

Scottish Ambulance Flights

TWO R.A.F. aircraft made "mercy" flights to Dyce Airport, Aberdeen, on April 28th. An Anson flew a sick airman from Stornoway, and meanwhile a Mosquito from Northolt was racing to Scotland with a supply of streptomycin for his treatment. The patient, A/C. Macaulay, was on leave when tubercular meningitis developed.

R.A.F. Adviser in Canada

A CDRE. C. W. BUSK, C.B., M.C., A.F.C., until recently Air Officer in Charge of Administration, Reserve Command, Royal Air Force, has taken up a fresh appointment as R.A.F. Adviser to the U.K. High Commissioner in Canada and Head of the U.K. Air Liaison Mission in Canada.

An armament specialist, A. Cdre. Busk was Deputy Director of Flying Training (Armament) at the Air Ministry from 1940 to 1943. In 1944 he became the first Commandant of the Empire Air Armament School at Manby, Lincs, where he remained until he went to Reserve Command as A.O.A. in May, 1946. Commissioned in the Suffolk Regiment in 1916, he was seconded to the Royal Flying Corps in the same year and transferred to the R.A.F. in 1918.

No. 44 Squadron for Rhodesia

A FAMOUS squadron of Bomber Command—No. 44 (Rhodesia) Squadron—will make a training flight early in June to Southern Rhodesia, with which it has close associations. The squadron was "adopted" by Southern Rhodesia under a Commonwealth affiliation scheme during the last war. Money for new aircraft was given by the people of the Dominion and in appreciation of the gift the squadron has been officially known as No. 44 (Rhodesia) Squadron since October, 1941.

The squadron was the first to be equipped with Lancasters and it was in one of the first Lancaster operations of the war that S/L. J. D. Nettleton, a South African, who led a formation from No. 44 Squadron on this occasion, won the Victoria Cross in the daylight attack on the diesel engine factory at Augsburg on April 17th, 1942. Since the war the squadron has been re-equipped with Lincolns.

Insurance Aid

FROM April 1st the Air Ministry will refund part of any extra insurance premiums paid to cover service aviation risks during peacetime flying training by reserve and auxiliary officers and airmen. Those affected are General Duties Branch officers and aircrew of the R.A.F.V.R. and R.Aux.A.F., Class A Officers of the Reserve of Air Force Officers, and Class E aircrew of the R.A.F. Reserve.

The scheme will apply only to the extra premium charged by insurance companies in respect of service aviation risks where the individual is already personally insured. Civil flying risk insurance is not included. Refund on an annual basis of extra premiums for service aviation risks will be according to the following scale: For policies representing sums assured of up to £500 in all, nine-tenths of the extra premium; for policies representing sums assured of over £500 in all, nine-tenths of the extra premium on the first £500, three-quarters of the extra premium on the second

Service Aviation . . . . .

£500, one-half of the extra premium on the next £1,500; no further relief after £2,500.

Priority Trades

SEVENTEEN R.A.F. trades, including seven radar and four clerical trades, have been given top priority for R.A.F. regular recruiting. The trades are: Clerk Equipment Accounting, Clerk Special Duties, Cook (Group B), Air Radar Fitter, Ground Radar Fitter, Air Radar Mechanic, Ground Radar Mechanic, Safety Equipment Worker, Equipment Assistant, Clerk General Duties, Clerk Pay Accounting, Nursing Orderly, Wireless Telegraphy Operator, Radar Operator, Radio Telephony Operator, Air Radar Assistant, Ground Radar Assistant.

Canadian Transport Command

THE Transport Administration of the Royal Canadian Air Force, formerly known as No. 9 (Transport) Group, has been raised to the status of a Command. Established, with headquarters at Rockville, in February, 1945, the Group took over the work of the old Directorate of Air Transport. It was responsible for all air transport duties, including carrying freight to hinterland stations, ferrying, aerial photography, mail carrying, ambulance work and V.I.P. transport, and in the last calendar year flew 16,897 hours on transport operations, carried more than 23,000 passengers and over 4,000,000 lb of freight.

Air Commodore L. E. Wray, commander of the Group, now assumes the position of Air-Officer-Commanding Air Transport Command.

Education for Airmen

ALL airmen and airwomen are to be given educational training in future during working hours in their first two years as part of their service training. In their first year, this will be for two hours a week, one hour for general education and one hour for citizenship and current affairs. In their second year it will be for only one hour a week, on citizenship and current affairs. During the winter, extra classes may be arranged in working hours as conditions permit. This instruction is in addition to voluntary education in off-duty times under the General Education Scheme and service training courses which may last up to 18 months.

Although the work will be chiefly the responsibility of Education Officers, other officers, senior N.C.O.s, part-time teachers and lecturers may have to act as instructors. Junior officers have in any case to study current affairs for their promotion examinations.

BUSY AT FILTON: Flying training at No. 12 Reserve Flying School, established at the Bristol Aeroplane Company's Filton airfield, began on April 24th. Seen here (l. to r.) Trainees Pilot II McDonald and F/O G. H. Kitchen (R.A.F.V.R.), Mr. C. R. Cubitt (flying instructor), Mr. W. Millar (flying instructor), Mr. H. M. Kerr (Chief Flying Instructor), Mr. C. T. Holmes (Flying School Manager, B.A.C.), S/L. P. E. Dodson, D.F.C. (Officer Commanding No. 22 Reserve Centre), F/L. A. F. Arnold (Chief Instructor, No. 22 R.C.) and S/L. T. G. Maxwell, D.F.C. (O.C., R.A.F. Station, Filton).

Benevolent Fund Report

THE 28th annual report of the R.A.F. Benevolent Fund shows that by the end of 1947 a total of £1,990,856 had been spent by the Fund since its foundation in 1919. Of this amount, over £1,500,000 was spent in the last four years. A total of £569,160 was spent in 1947 when members of the public and R.A.F. contributed £418,157.

Individual items of expenditure in 1947 included £124,638 for general maintenance and £37,664 for pressing debts; £37,266 for business grants and loans; £42,220 for general and higher education, excluding the Alexander Duckham Memorial Schools; £37,795 for travel and removals; £14,216 for clothing, boots and bedding; £15,929 for prams, cots, layettes, etc.; £2,633 for tools and working equipment; and £899 for spectacles and eye-treatment.

The report cites examples of aid given. An ex-Corporal's wife was sent to Switzerland to receive treatment to save her life. The cost of the education of the three elder children of a Flight Lieutenant killed on active service was defrayed by the Fund. Money was loaned to a Leading Aircraftman faced with legal expenses when he sought compensation after a motor cycle accident. A Flight Sergeant, discharged after an aircraft accident, was helped to start a motor business.

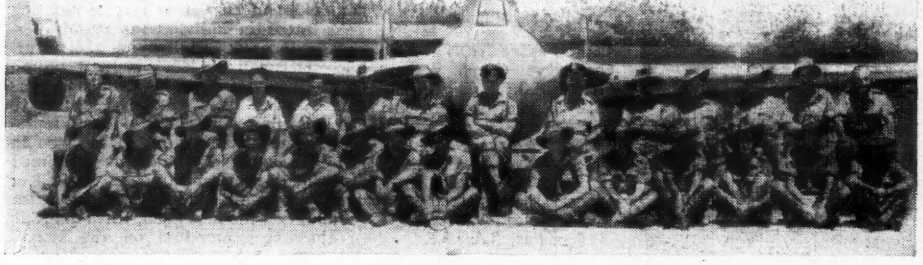
No. 15 Reserve Flying School

ON April 1st, No. 15 Reserve Flying School opened at Redhill, Surrey, and is now operating seven days a week. A large number of applications to rejoin the R.A.F.V.R. have been received, together with a number of transfers from other stations.

This Unit has been formed from the old No. 15 Elementary and Reserve Flying Training School which was operated by British Air Transport, Ltd., from 1936 onwards, both at Redhill and Carlisle; the Commanding Officer and Chief Flying Instructor is W/C. T. M. Scott, A.F.C., who latterly was in command at Carlisle. Amongst those who are assisting him are S/L. E. P. Lash, A.F.C., and F/L. J. F. M. Bevan, A.F.C., both of whom were instructors at Carlisle during the war.

Members of the Reserve of Air Force Officers may also fly at this Unit, together with regular officers of the R.A.F. General Duties Branch who may be stationed at non-flying units in the vicinity.

The ultimate strength of the Unit will be 24 elementary training aircraft, together with six Ansons for navigational training, but this latter part of the school's curriculum is not yet in operation.



TROPICAL TEST TEAM: Though lacking in clarity (his friends might easily fail to recognise the O.C., S/L. Patrick Barthropp, D.F.C., in the centre) this group photograph does indicate the strength of the A. & A.E.E. Tropical Experimental Unit, Khartoum, and illustrates the headgear in favour. Trials are at present in progress on the Vampire and Brigand.

Where

BRITAIN

leads

It is generally admitted that in the manufacture of special purpose paints and finishes the British product leads the world. Prominent amongst such special purpose paints are:—

BRITISH REGD. TRADE MARK

DOCKERS *Aircraft* FINISHES

Proved on record-breaking Jet plane flight

DOCKER BROTHERS, LADYWOOD, BIRMINGHAM, 11.

Makers of Paints, Varnishes and Lacquers for every purpose

"Let us quote you for any aircraft, radio or engine work you require."

AIRTECH LTD.

AYLESBURY AND THAME AIRPORT, HADDENHAM · BUCKS.

Telephone: Aylesbury 1173-4

Also at Bovingdon and Croydon Airports

OUR SPECIALISED SERVICE INCLUDES

- Halifax Freighter modifications.
- Dakota Passenger conversions.
- Consul, Rapide, Fairchild and Proctor C of A and repairs.
- Cheetah, Gipsy and Cirrus complete Engine overhauls.
- **Radio and Radar installations and repairs.**

Whatever the task, be it aircraft, radio or engines, we will do the job speedily and efficiently.

AIRCRAFT SALES

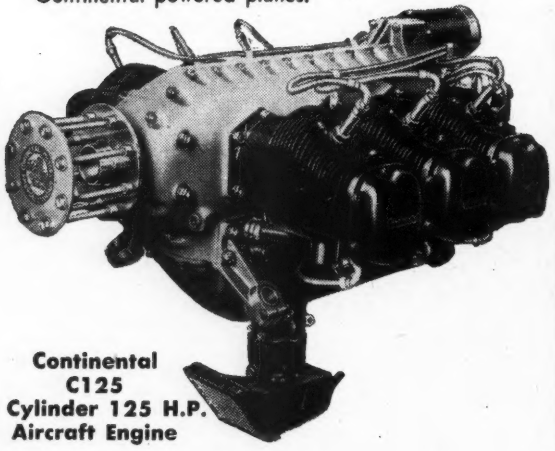
- Early delivery of Halifax Freighter Aircraft and spares.

Continental

PARTS and SERVICE *Available* Throughout the World

Wherever a Continental powered plane is flown, genuine Continental parts are available. On every Continent, in almost every country, well supplied parts depots have been established to service Continental powered planes. When the engine is Continental, the market for the plane is world wide.

Coupled with the accessibility of parts is the fact that Continental engines are designed for easy service and overhaul when needed. Every part of these engines, basically simple in design, is easy to get at for inspection or replacement. This lowers costs, makes maintenance easier in Continental powered planes.



Continental C125 6 Cylinder 125 H.P. Aircraft Engine

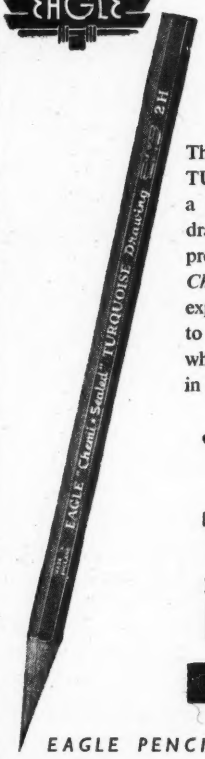
Continental Pioneered Engines for Light Airplanes

Continental Motors Corp. is the world's largest independent builder of internal combustion engines. During half of its 46 years of operation, engines for light aircraft have been a major factor in Continental's manufacturing operations. The great majority of all light planes in the world are Continental powered. Millions of flight hours have proved the reliability and economy of Continental engines. Write for free booklet about the Continental line which ranges from 65 to 525 horsepower.

Continental Motors Corporation

AIRCRAFT DIVISION, MUSKEGON, MICHIGAN

EAGLE



A GUARANTEE OF GRADING

That is what each Eagle *Chemi-Sealed* TURQUOISE Drawing pencil gives you; a 4B is always a 4B; a 6H never varies; draughtsmen can always depend upon their precision of workmanship. At present, *Chemi-Sealed* TURQUOISE are available for export only, but the same guarantee applies to EAGLE WAR DRAWING PENCILS which are manufactured for the home market in a permitted range of 2B to 4H degrees.

"Chemi-Sealed"
SUPER-BONDED
TURQUOISE
DRAWING PENCILS
NOW AVAILABLE FOR EXPORT

EAGLE PENCIL COMPANY · LONDON · N17

Padhacksaw — the saw that has no limits

The Padhacksaw does the work of hacksaw, padsaw, keyhole saw, corrugated iron saw, shears, snips, chisels, pipecutters, etc. There is no frame to pass over or through the work, it makes cuts of unlimited length, and can be used in the most awkward places. A variety of blades for all classes of work can be quickly fitted.

Retailer's and Factor's prices on application :

The Padhacksaw

HALE. HAMILTON & CO. LTD., 107, Old Broad St., London, E.C.2

TEDDINGTON CONTROLS Ltd.

CEFN COED, Nr. MERTHYR TYDFIL, S. WALES

Teddington

★

accessories contribute to the reliability of the

DE HAVILLAND HORNET

★ Rolls-Royce Engines as fitted to the **DE HAVILLAND HORNET** incorporate many Teddington control devices including Radiator Flap Inching Controls.

Marshall CABIN SUPERCHARGERS

The Marshall Type 15 Cabin Supercharger as shown is designed for the medium sized Air Liner. It has a capacity of 15 lb. of air per minute, at a delivery pressure of 7lb./sq. in. above intake pressure at 25,000 feet.

In addition we manufacture Cabin Superchargers with capacities of from 5 to 30 lbs. per minute at the above conditions.

SIR GEORGE GODFREY AND PARTNERS LTD

HAMPTON ROAD · HANWORTH · MIDDLESEX · ENG

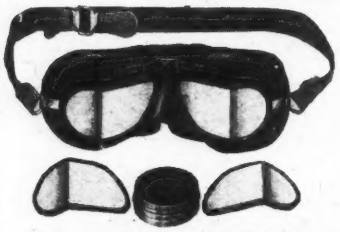
RP-2049B

FLIGHT

CLASSIFIED ADVERTISEMENTS

Prepaid Advertisement Rates: 3/- per line, minimum 6/-, average line contains 6-7 words. Special rates for Auctions, Contracts, Patents, Legal and Official Notices, Public Announcements, Tenders, 4/- per line, minimum 8/- per paragraph. Box Number facilities available for the convenience of private advertisers, add 2 words plus 1/- to defray the cost of postage and forwarding replies. Press day, FIRST POST THURSDAY, or one day earlier at Branch Offices. No responsibility accepted for errors. Remittances payable to: Flight Publishing Co. Ltd., Dorset House, Stamford Street, London, S.E.1.

FLYING EQUIPMENT



Brand new ex-R.A.F. wide vision **GOGGLES**, complete with spare lenses, **22/6**. Luxor goggles, **50/-**. Triplex goggles, **7/6**, with spring head band, **12/6**. Tan leather chamois-lined flying helmets, **27/6**.

Black or Tan Lumber or three-quarter style LEATHER JACKETS. Write for list.

Brand new **R.A.F. KAPOK INNER SUITS**, fully zipped, **28/6**. Coupon free **DUFFLE COATS** from **55/-**. Reconditioned Lambswool Lined **ex-R.A.F. FLYING BOOTS**, Black calf Leather Uppers, with waterproof canvas tops, at **75/-**; **ex-R.A.F. ESCAPE BOOTS** with black suede tops, zip fasteners, at **80/-**. ALL BOOTS COUPON FREE.

Fur and sheepskin lined **FLYING JACKETS** and **TROUSERS** now in stock at reasonable prices. ALL are COUPON FREE. Write, call or 'phone for particulars.

All goods are sent POST FREE unless otherwise stated.

QUICK SERVICE, SPECIAL TERMS TO FLYING CLUBS — SECRETARIES, WRITE FOR PARTICULARS NOW.

Illustrated list on receipt of 1d. stamp. Trade supplied

D. LEWIS LTD. (Dept. F.)

Leather Clothing Manufacturers for Home or Export

124, GT. PORTLAND ST., LONDON, W.1

Trade Enquiries Invited

Tel.: Museum 4314. Tele.: Aviakit, Wesdo, London

DALTON COMPUTORS

Mk. IIID* I.C.A.N.

Pilot Navigator Type, with Knee Attachment and Log.

50/- NEW

(Postage 1/-)

"LINK" A-12 Bubble Sextant.

Non-averaging, a light-weight sextant for marine or air use—in fitted case. **90/-** (Post 1/6)

AERO-SPARES CO., *(Government Contractors)*

Aero Warehouse: 69 Church St., Edgware Road, London, N.W.8. *A M Bassador 4886*

AIRCRAFT FOR SALE

SHACKLETON

W. S. SHACKLETON, Ltd., offer unprecedented bargains:—

£???—Proctor V, brand new and still at makers' works; complete with long-range tanks, dual control and flight spares; a friend of ours bought this machine recently to fly himself and family to South Africa but all his plans had to be changed at the last moment and he has now instructed us to accept the best offer we can get for it; roll up please!

W. S. SHACKLETON, Ltd., offer a number of Aer Lingus Vikings at a considerable reduction off the prices of new aircraft with comparable equipment.

£775—Standard Auster Autocrat; under 100 hours since new; built last year and with year's C. of A.; magnificent order.

£350—Miles Magisters with year's C. of A. and in beautiful condition.

£250—Chilton single-seater 30hp Carden Ford engine; this ultra-light plane is in very clean condition.

£2500—Airspeed Consul offered with year's C. of A. by the manufacturers; complete with STR.16/17 radio and £300 worth of spare parts; this aeroplane represents the most outstanding bargain ever offered by Shackletons.

£750—Auster Arrow, 75hp Continental engine, perfect order, just completed C. of A. overhaul; well under 100 hours; starter and generator; Shackletons.

£395—Tipsy Trainer, formerly property of Air Chief Marshal Sir Arthur Longmore; 3 hours since C. of A. renewal; under 300 total.

£995—Fairchild Argus; Warner Super Scarab engine, complete equipment, year's C. of A.; 4 seats.—Shackletons.

£2400 upwards.—Miles Aerovans with year's C. of A., wireless, etc.

£445—Moth Minors, low hours, current C. of A.; another special price reduction.—Shackletons.

W. S. SHACKLETON, Ltd., 175, Piccadilly, London, W.1. Tel.: Regent 2448-9. Cables: Shackhud, London. [0070

FIELDS

FIELD AIRCRAFT SERVICES, Ltd.

£4000—Anson Mark I, 8 passenger seats, 2 crew, 12 months' C. of A., this aircraft has been entirely newly upholstered and carpeted throughout, colour scheme silver and blue, interior upholstery grey leather, radio Marconi 1154/55, D/F loop and visual, a first-class bargain.

£18,500—Dakota 21-seat passenger, 24-volt, polished metal finish, 12 months' C. of A., radio Liaison Command, Bendix radio compass, Rebecca.

RAPIDES.—Fully equipped 7/8 passengers, toilet, 12 months' C. of A., any offers

PROCTORS.—Field's are specialists in reconditioned and second-hand Proctors.

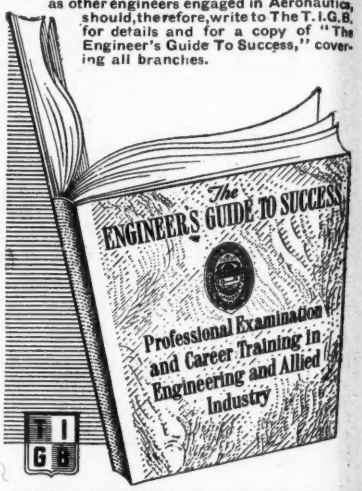
WRITE or telephone Field Aircraft Services, Ltd., Croydon Airport, Surrey. Tel. Croydon 7455. Cables: Fieldair, Croydon. [0258

AIRCO, Ltd.—Suppliers of aircraft; export enquiries invited.—109, Jermyn St., London, S.W.1. Tel. Aerosup, Piccy, London. 'Phone: Whitehall 8863. [0312

Aircraft Maintenance Engineers' Courses

FOR CATEGORIES A, B, C and D

The T.I.G.B.'s up-to-date courses for the above completely cover requirements and are **on the technological and fully informative lines which candidates require.** All candidates for licences, as well as other engineers engaged in Aeronautics, should, therefore, write to The T.I.G.B. for details and for a copy of "The Engineer's Guide To Success," covering all branches.


The
ENGINEER'S GUIDE TO SUCCESS
Professional Examination and Career Training in Engineering and Allied Industry
T I G B

The Professional Engineering & Aeronautics Tutors,

THE TECHNOLOGICAL INSTITUTE OF GREAT BRITAIN,

384, TEMPLE BAR HOUSE, LONDON, E.C.4

IMPORTANT GUIDE

This unique handbook, "Engineering Opportunities," outlines over 200 home-study Courses of technical instruction, including **Aeronautical Engineering, Aeronautical Design, Aero Engines, Air Navigation, Aircraft Engineers' Licences (Ground Engineers), A.F.R.Ae.S., A.M.I.Mech.E., R.A.F. Maths.,** etc.

Our courses have been approved by the **Royal Aeronautical Society** and WE GUARANTEE

"NO PASS—NO FEE"

A copy of this enlightening guide to well-paid posts will be sent on request—**FREE.**

BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY

306, Shakespeare House, 17-19, Stratford Place, London, W.1.

SBAC
THE SOCIETY OF BRITISH AIRCRAFT CONSTRUCTORS
AMAL
Component Specialists to the Aircraft Industry
AMAL LTD · HOLFORD WORKS · BIRMINGHAM, 20

AIRCRAFT FOR SALE

AIRWORK LIMITED.

AIRWORK, Ltd., has completed negotiations with B.E.A. whereby it becomes the sole selling agent for the fleet of redundant DH 89 aircraft recently operated by B.E.A.

AIRWORK, Ltd., still have available for delivery early this year a number of De Havilland Doves, a limited number of second-hand Airspeed Consuls, Miles Aerovans and Gemini aircraft, all with C. of A.s' delivery date for the De Havilland Doves is earlier than De Havillands themselves can undertake. ENQUIRIES invited to Airwork, Ltd., Sales Division, 15, Chesterfield St., London, W.1. Tel. Grosvenor 4841. [0407

AVIATION TRADERS, LIMITED.

HALIFAX freighters with 12 months C. of A. for immediate delivery with unlimited spares; enquiries invited for all types of aircraft, spares and equipment.—Aviation Traders, Ltd., 78, Buckingham Gate, London. Tel. Whitehall 8738. [1771

MILES Gemini.

NEW, complete with metal propellers, finished silver, 12 months' C. of A., can be fitted with wireless and full night flying facilities; other aircraft taken in part exchange.

PATRICK-DUVAL AVIATION, Ltd., 34, Paradise St., Birmingham, 1. Mid. 3954. [0396

AIR Speed Consul.

A FINISHED blue, 12 months' C. of A. air frame 408 hours, engine 435 hours, fully tropicalised sun blinds, full blind flying instruments, full str. radio, six passenger seats, cabin heating and door between passengers and crew, full navigation lights, landing lights, the aircraft new in Jan. 1947; part exchanges considered.

PATRICK-DUVAL AVIATION, Ltd., 34, Paradise St., Birmingham, 1. Mid. 3954. [0380

R. K. DUNDAS, Ltd.

FOREIGN travel again and just enough fuel for the private owner mean that it's time to think about getting into the air again this summer; the Continental air rallies are inviting.

WE have a useful range of light aircraft at the right prices.

R. K. DUNDAS, Ltd., Aviation Division: 4, St. James's St., S.W.1. Whitehall 2848. Head Office: The Airport, Portsmouth. [0212

LINK trainers for sale.

FLYING clubs, air lines, pilots!

YOUR opportunity to purchase Link trainers at a ridiculously low price; ex-Ministry of Supply; crated and packed, complete installations.

FOR full description of link trainer, installation, maintenance and operation we suggest that interested persons obtain the following text book:—"THE Link Trainer" by E. Molloy, George Newnes, Ltd., Aeroplane Maintenance and Operation Series, Volume 8; we can also offer large stocks of new and unused Sperry, Smiths & Kollsman aircraft instruments including directional gyros, artificial horizons, turn and bank indicators, altimeters, air speed indicators, pilot heads, automatic pilots, etc., radar equipment, radio receivers, motor generators, valve spares.

SEND for our detailed lists letting us know your quantity requirements.

WIRELESS INSTRUMENTS (LEEDS), Ltd., 54-56, The Headrow, Leeds, 1. Tel. 22262. [1790

HERTS & ESSEX AVIATION, Ltd., Broxbourne Aerodrome, Nazeing, Essex.

LIGHT aircraft for sale and wanted, enquiries welcomed. Ring Hoddesden 3180. [0818

AIR TRANSPORT & SALES, Ltd., for new and second-hand aircraft.—5, Clarges St., London, W.1. Grosvenor 4653. [0363

AVIATION Department of Autowork (Winchester), Ltd., offer the following aircraft, etc.; immediate delivery; aircraft or cars in part exchange, hire purchase facilities available.

RAPIDE, Gipsy Queen III engines, completely overhauled, C. of A. to May 1949, radio, etc.; as new throughout.

ANSON, civil conversion, 6-passenger seats, 2 crew, airframe and engine hours all approximately 550; unused since conversion and almost 12 months' C. of A.

PROCTOR Mk. IV finished silver, grey leather interior, full 4-seater; C. of A. to April 1949; condition practically new.

D.H PUSS-MOTH, Gipsy III engine, high-wing cabin monoplane, folding wings, 3 seats, full dual, magnificent condition, C. of A. to April 1949.

SPARES for Leopard Moth, Puss Moth, Anson, etc.; Cheetah IX engines, etc., etc.

AUTOWORK (WINCHESTER), Ltd., Station Hill, Winchester. Tel. Winchester 4834 and 3406.

PROCTOR V, finished silver with red flashes and red leather upholstery, full blind flying instruments and navigation lights, sun blinds, approximately 425 engine frame hours, C. of A. due end of July, part exchange is considered or can offer at very low cash basis.

PATRICK-DUVAL AVIATION, Ltd., Paradise St., Birmingham, 1. Tel. Mid. 3954. [0820

AIRWORK LIMITED

has the following aircraft for sale

for delivery in June

de Havilland "Doves"

for early delivery

Used Airspeed "Consuls"
Used Miles "Aerovans"
Used Miles "Geminis"

for immediate delivery

D. H. 89 Aircraft (recently operated by B.E.A.)
Two Mark I.B. all metal long nosed "Vikings," with new C.'s of A.

Enquiries invited to:

AIRWORK LTD. Sales Division
15, Chesterfield St., London, W.1
Telephone: Grosvenor 4841

QUICKER-STRYP 32

REMOVES STOVED ENAMEL CELLULOSE FRENCH POLISH VARNISH & THIN COATS OF PAINT IN ONE APPLICATION

-is-

- **Non-Acid, Non-Flam**
- **Non-Alkaline**
- **Non-Injurious** to eyes, skin or clothes

QUICKER-STRYP

- **Works rapidly**
- **Strips completely,** right down to the bare wood, metal or glass
- **Does not dry up**
- **Has given full satisfaction** to the Aircraft Industry for many years
- **Is M.A.P. Approved**

Write for further particulars
Export enquiries invited

QUICKSTRYP CHEMICAL CO. LTD. (Dept. F)
57, Kingsland High St., E.8.

CUT YOUR LABOUR COSTS

AIRCRAFT FOR SALE

£795.—Proctor 1 aircraft, fitted dual control, 500 hours since new, 12 months C. of A., appearance as new, finished blue and silver; a fast and reliable aircraft; demonstrations arranged on request.—Box 7485. [1787

FOR sale, Miles M.28 4-seater, small engine and airframe hours, full blindflying panel, retractable undercarriage, in new condition throughout, not flown since new C. of A.; £2,580, or would consider late model car with cash adjustment.—Box 7393. [1766

MILES GEMINI, £1,200 less than list price; fitted with 2 brand new unused engines for long distance flight to Australia, 12 months' C. of A. by makers, airframe 90 hours, including Murphy VHF radio, full Sperry blind flying panel, metal propellers, landing and navigation lights, sunblinds, sensitive altimeter, also R. and S. turn and bank indicator, rate climb indicator, slats, air log, clock, etc.; ready to fly away; only test flown since C. of A.; owner purchasing new aircraft; price £3,200; paintwork, upholstery and whole aeroplane absolutely indistinguishable from new, colour silver-aluminium.—The Owner, Hawk's Hill House, Bourne End (Tel. 755), Bucks. [1785

AIRCRAFT WANTED

PIPER Cub wanted; side by side seating preferred; would consider American ex-service machine if really 100% condition.—Box 7640. [1829

W. S. SHACKLETON, Ltd., require urgently all types of aircraft for resale, but particularly 2-seater, closed aeroplanes to sell at prices under £500. We will either buy them outright, sell on commission, or negotiate a swap. Anything from a Piper Cub to a Halifax.

W. S. SHACKLETON, Ltd., 175, Piccadilly, London, W.1, the biggest dealers in used aeroplanes in Europe. [1845

AIRCRAFT ACCESSORIES AND ENGINES

HOTSPUR glider wheels for disposal; we are dismantling all types of aircraft.—Mallaber & Prince, Alrewas, Burton-on-Trent. Tel. Alrewas 304. [1761

AERO Tyres.—Inquiries invited for all sizes new and unused giant and small Aero Tyres.—Foundation Oil Co., Ltd., 8, Orford Hill, Norwich. [1830

T1154-R1155 Aircraft Power Units, 12 & 24 volt; excellent condition; guaranteed perfect working order.—Box 11, Smith's Bookstall, Croydon Airport. [1823

CECIL KAY, Ltd., have aircraft spares for sale; magneto for D.H. Rapide, life jackets, Verey pistols, etc.—Apply 10/20, Essex St., Birmingham, 5. Tel. Mid. 3011 [1850

AIR CHARTER

HOLIDAYS in Switzerland from approximately 21st June and for 10 days by private 3-seater aeroplane, 2 seats available.—Box 7444. [1853

MORGAN AVIATION, Ltd., Cowes Airport, Isle of Wight, for air taxis and freighting to all parts of British Isles and Europe.—Tel. Cowes 535. [0411

COMPANY owning several Magister and Tiger aircraft open to entertain hiring same on long term basis to individuals or clubs; with or without C. of A., etc.—Box 143, c/o Granthams, Advertising Agents, Reading. [1836

BROOKLANDS AVIATION, Ltd.—Proctors and Rapides available for air charter at Brooklands Aerodrome, Weybridge (Tel. Byfleet 436), Sywell Aerodrome, Northampton (Tel. Moulton 213511); Shoreham Airport, Sussex (Tel. Shoreham 2366). [0306

AIRCRAFT SERVICING

AIRWORK LTD.

AIRWORK, Ltd., the largest aircraft maintenance organisation in the United Kingdom.—Contact 134, Bath Rd., Hounslow. Tel. Hounslow 5451. [0386

BROOKLANDS AVIATION, Ltd., Brooklands Aerodrome, Weybridge.—C. of A. overhauls, modifications and conversions. Tel. Byfleet 436. [0305

REPAIRS and C. of A. overhaul for all types of aircraft.—Brooklands Aviation, Ltd., Civil Repair Service, Sywell Aerodrome, Northampton Tel. Moulton 3251. [0307

AIRCRAFT servicing repairs and C. of A. overhauls at competitive prices; radio installation, testing and servicing.—Westminster Airways, Ltd., Blackbushe Airport, Camberley. Tel. Yateley 3242. [0326

C. OF A. Overhauls.—The lowest charge for efficient work; let Somerton Airways undertake the C. of A. on your Auster at an average quotation of £35-£40.—Somerton Airways, Ltd., Cowes Airport, Cowes 535. [0303

NORMAN RANSON, AERELECS, Ltd., BTH and Rotax aircraft equipment, sales and service; generators, starter-motors, magnetos, electro-hydraulic pumps, etc.; Lodge aero plug distributors.—Works, Main St., Prestwick, Ayrshire. Tel. 78236. [1752

IMMEDIATE capacity for engine and aircraft overhauls and renewals of C.s of A. on large or small wood or metal aircraft; Halifax and Dakota conversions a speciality; special consideration given to private owners, flying clubs, etc.; estimates free.—C. L. Air Surveys, Ltd., The Airport, Doncaster. Tel. Doncaster 55439. [0365

AERONAUTICAL ENGINEERS AND AGENTS

R. K. DUNDAS, Ltd.—Aeroplanes, engines, aeronautical equipment and accessories agents at home and abroad for the Aircraft and Allied Industries; branches and agents throughout the world.—Head Office: 4, St. James's St., S.W.1. Tel. Whi. 2848 [0215

BIRTHS

ALABASTER.—On May 2nd, 1948, to Margaret, wife of Capt. R. C. Alabaster, D.S.O., D.F.C., of 248, Bridgewater Road, Sudbury, Middx. a son (Nigel Frederick). [1848

BOATS FOR SALE

HAVE you an outboard motor on your dinghy? If not we have them for immediate delivery—the British Seagull outboard—the most reliable outboard motor in the world.

HAVE you a boat on your outboard motor? We have them too—dinghies of all sizes, new and second-hand, sailing dinghies complete with all gear.

W. S. SHACKLETON, Ltd., 175, Piccadilly, London, W.1. Tel. Regent 2448-9. Cables: Shackhud, London. [1847

BOOKS, ETC.

FOR sale, *Flight*, May, 1946, to December, 1947; offers.—Jackson, 29, Albert Park Road, Malvern. [1827

AERO-ENGINES for Students including Gas Turbines by R. A Beaumont. "Knows his subject and how to make it interesting."—*Aeroplane.* "Recommended to the serious student before embarking upon a more advanced study of the subject."—*Flight.* Revised, enlarged edition. Illustrated, 12s. 6d. net. George Allen & Unwin Ltd., 40, Museum St., London, W.C.1. [1825

CAR and COACH HIRE SERVICE

MOTOR coaches, 24-hour service, airports, Continental travel, private charter. — Stockland Coaches, Erdington, Birmingham. Tel. Erd. 1189-0703. [0398

CARS FOR SALE

W. S. SHACKLETON, Ltd., offer for sale two cars which have been taken in part exchange for aircraft:—

AUSTIN 7 1937 black saloon with new radiator, new tyres, overhaul, etc., and C. of A.—I beg your pardon—licence until December, 1948. Best offer over £110.

LINCOLN V.12 Zephyr, 1936-7 model, black saloon, a product of the tasteful pre-mouth-organ-front era.

A FAST, roomy family car, completely overhauled by Lincolns last year. Best offer over £550.

W. S. SHACKLETON, Ltd., 175, Piccadilly, London, W.1. Tel. Regent 2448-9. [1846

CELLULOSE

CELLULOSE, auto and industrial grades, synthetics, flock, decorative paints, upholstery cellulose strippers, etc.; cat. 1d. Goods despatched same day; plant hired.—Leonard Brooks, Harold Wood, Essex. Ingrebourne 2560. [0383

FINEST quality motor cellulose goods and commodities, also spraying equipment, immediate delivery, satisfaction guaranteed; also Niagara marvellous upholstery leather dye, 30/6 quart tin nett; all colours.—Excel Motor Co., 445, Waterloo Rd., Blackpool. [0364

CLUBS

REDHILL FLYING CLUB.

LEARN to fly amidst delightful surroundings at Redhill Aerodrome, Surrey, South London's nearest flying centre, 23 miles from Hyde Park Corner, 32 minutes from Victoria Station; flying training on Austers and Magisters, £3/10 dual, £3 solo per hr.; instrument flying, instructors' B licence courses; attractive clubhouse with full catering facilities.—Tel. Nutfield Ridge 2245-3234. [0347

WILTSHIRE FLYING CLUB.

DUAL or solo, Magisters and Austers from £2/12/6 per hour.

INSTRUCTORS licences and instrument flying from £3 per hour, night flying from £3/5 per hour, air charter from 4d. per passenger mile; residence 3½ gns. per week, fully licensed restaurant and bar; booklet.—Thruxton Aerodrome, Andover, Hants. (Weyhill 352). [0253

BREVET FLYING CLUB.—Fully licensed residential club house, excellent food, membership now exceeds 10,000; meet the flying types at the "Brevet"; membership, £1/1 p.a.—Secretary, 11, Chesterfield St., Mayfair, W.1. Gro. 1353. [0392

DENHAM AERO CLUB.—Fully licensed clubhouse, good food, beautiful swimming pool, 40 min. Paddington Stn.; flying rates from £2/15, dual £2 solo per hour; average dual to solo six hours; a/c, Piper Cubs, Auster, Proctor, Magister; fly yourself hire and charter.—Telfl. Denham 2161. [0409

COWES AERO CLUB.—Flying instructions at £3 per hour (dual and solo) for Moth and Auster aircraft, combine your flying instruction with a holiday by the sea, accommodation and all details arranged; attractive clubhouse offers full social amenities, short-term membership avialable.—Full details from Secretary, Cowes Airport, Isle of Wight. Tel. Cowes 535. [0304

HERTS and Essex Aero Club Broxbourne Aerodrome, Nazeing, Essex, 15 miles from centre of London, L.N.E.R. from Liverpool Street or Green Line Route 715 every 20 minutes from Broadcasting House; flying training in Tiger Moths, Hornet Moths, Austers and Magisters, dual £3/5, solo £3 per hour; instructor's courses, air charter and photography, residential clubhouse, restaurant; trial lesson, half an hour in the air with an instructor, 30/-.—Tel. Hoddesdon 2453. [0230

CONSULTANTS

WING COMMANDER R. H. STOCKEN, F.R.Ae.S., Eagle House, 109, Jermyn St., London, S.W.1. Tel 8863. [0919

EXPERIMENTAL WORK

PROTOTYPES; specialists in experimental work, design and construction of special machinery and electro-mechanical mechanisms.—Research Engineers, Ltd., Northampton Grove, Canonbury, London, N.1. Canonbury 4244-5. [0384

HOTELS AND ACCOMMODATION

ROYAL OAK HOTEL, Keswick-on-Derwentwater, heart of English Lake District, offers restful holiday to Air Force personnel; first-class accommodation at reasonable charges. [0814

AIR TRAINERS LTD.

MANUFACTURERS OF

LINK TRAINERS

(Sole Licensees for the British Empire)

AND OF THE

MILES MOTOR DRIVING TRAINER

SPECIALIST TRAINING DEVICES FOR ALL PURPOSES

BICESTER ROAD
AYLESBURY
TEL: 1185

FLYING HELMETS and GOGGLES

Wholesale & Export ENQUIRIES INVITED

Club Enquiries Welcomed

Kett KIT

KETT MANUFACTURING Co. Ltd.
ARROWHEAD PARADE, HARROW VIEW, HARROW, MDDX. Phone: UNDerhill 0295

Nearest to Europe — Quickest to London

TRAVEL THE RAIL-AIR-WAY

GATWICK AIRPORT

Send for attractive booklet

AIRPORTS LTD., GATWICK AIRPORT
TEL: HORLEY 1000 SURREY

DUNLOP & RANKEN LTD

Telephone LEEDS 27301 20 LINES

STEEL SECTIONS & BARS PLATES SHEETS HOOPS ETC

STRUCTURAL STEELWORK

INSURANCE

AVIATION insurance, personal accident (flying) policies.—J. W. T. Amey, Messrs. R. J. Moffat & Co., 796, High Rd., Tottenham, N.17. Tottenham 2003-4-5. [0300

MISCELLANEOUS

NO coupon clothing

AND camping equipment.

AMAZING offer of brand new and reconditioned EX-AMERICAN and British Government surplus stocks.

EX-R.A.F. waterproof flying suits, zip fitted throughout, complete with fur collar, 35/-; brand new, ex-American super warm, kapok filled, waterproof inner flying suit linings, 16/11; ex-Government women's navy blue tailored slacks, 18/11; ex-American 1st grade boiler suits, heavy quality belted and large roomy pockets, 24/6; women's, 15/6; khaki bush shirts, up to 15½ neck, 9/11; reconditioned ex-R.A.F. shirts, 10/6; ex-R.A.F. helmets, 10/6; brand new ex-Govt. men's fawn heavy double texture macks with belt, deep storm collar, large roomy pockets, 75/-.

CASH with order, postage and packing 1/3 extra.

MARCUS STORES, Ltd., Gravesend, Kent. [0402

R.A.F. embroidered gold wire blazer crests; 24/- each.—Willeringhaus & Co., Ltd., 48, North Side, Streatham Common, London, S.W.16. [0376

NEW Avondale Swan caravans, 16ft long, 2 doors, end kitchen, lantern roof, now on view at Caravania, Ltd., 200, Cricklewood Broadway, N.W.2. Gladstone 3434. [0207

EX-GOVERNMENT, as new, pop rivetters, 10/-; pneumatic cutters drills, spanners, £4, carriage paid.—Reynolds, Sedgeford, King's Lynn. Phone: Snettisham 284. [1828

R.A.F. officers' uniforms purchased; large selection of R.A.F. officers' kit for sale, new and reconditioned.—Fisher's, Service Outfitters, 86-88, Wellington St., Woolwich. Tel. Woolwich 1055. [1839

MESS kit, complete R.A.F. mess kit (Burberry) never worn, perfect condition, fit 5ft 10in-6ft., slim build; comprises jacket, overalls, blue and white waistcoats, buttons, etc.; price £15; also R.A.F. blazer, 50/-.—Write Box 7726. [1844

CARAVAN Opportunity.—Magnificent 1948 model, 16ft Bluebird Special, lantern roof, chrome windows, 4-berth; gas cooking, lighting, heating; two compartments; fully equipped; cost £625, never used; changed circumstances compel sale; accept £575.—Box 7643. [1834

CARAVANS.—Let us solve your housing problem. A comprehensive selection of new and secondhand caravans for permanent homes including the new 1948 Essex Major; prices from £325 to £1,850; easiest terms over 3 years.—X.L. Caravans, Blue Star Garage, Maidenhead. Tel. Maidenhead 783. [0405

INDUSTRIAL buildings for sale, Thorns second-hand buildings require no purchase licence and are easily erected with a minimum of labour; Nissen type huts, Blister hangars, steel and asbestos buildings, etc., suitable for factories, workshops, offices, garages, stores, canteens, etc.; also new buildings.—Write to J. Thorn & Sons, Ltd., Box 151, Brampton Rd., Bexleyheath, Kent. Tel. Bexleyheath 305. [0816

A CARAVAN lion tamer?—Ex-editor caravan paper, living in van 11 years, with Britain's biggest number of vans for sale, all guaranteed, often wishes he had a lion tamer's eye to discourage the fussy customer who wants a bath fitted on the roof; but he's too easy-going and, the bath goes on the roof, often at no extra expense; easy-going h.p. terms too, quarter down, rest up to 5 years; send for illustrated brochure; open always.—Tel. Maidenhead 2610. A. S. Jenkinson, Bath Rd., Taplow, Bucks. Easy to reach, right on main A.4. Taplow (Paddington) Stn. 4 mins. walk. [0278

PACKING AND SHIPPING

R. & J. PARK, Ltd., 143-9, Fenchurch St., E.C.3. Tel. Mansion House 3083; official packers and shippers to the aircraft industry. [0012

TIME RECORDERS

STAFF time checking and job costing time recorders (all makes) for quick cash sale; excellent condition.—Box 3654. [0040

TIME recorders; service rental.—Tel. Hop. 2239. Time Recorder Supply & Maintenance Co., 157, 159, Borough High St., S.E.1. [1556

TUITION

AIRCREW COURSE?

B.A.N.C.S. of course.

THE British Aeronautical Navigational Correspondence School (B.A.N.C.S.) are specialists in aircrew licences postal courses, so write to the Secretary, 143a, High St., Hythe, Kent, for the School's free prospectus. [0336

AIR TUTORS, Ayr, Ayrshire.

COURSES at Prestwick Airport for the new pilots' and navigators' licences, also instrument rating. TWIN and multi-engined aircraft and link trainers, fully equipped for S.B.A., radio range, I.L.S., G.C.A. and radio compass.

AIR exercises carried out on the spot thus reducing flying time.

POSTAL courses for all licences, moderate fees.

GOOD accommodation available. [0358

STRAIGHT AVIATION TRAINING.

SPECIAL arrangements for candidates for First-Class Civil Air Navigator's licence. Central Navigation School, Bush House, accepts students weekly for theoretical and Link trainer courses. Flying training for pilots and navigators.—Enquiries Bush House, Temple Bar 2913. [0413

TUITION

THE LONDON SCHOOL OF AIR NAVIGATION offers full-time Courses and special coaching facilities for all Pilots, Navigators and Radio Officers in addition to our part-time tutorial service. R/T Licence—special 3-day Courses available. 62, Great Cumberland Place, W.1. Pad. 4495/6. [0277

AIRCRAFT or automobile engineering. Complete practical and technical training for entry to either industry.—Syllabus from Bursar, College of Automobile and Aeronautical Engineering, College House, Princes Way, Wimbledon, S.W.19. Put. 4107.

THE EDUCO TECHNICAL SERVICE, BCM/EDUCO, London, W.C.1; individual postal tuition for Aircraft Engineer Licence examinations, also general aeronautical engineering, metallurgy, aero-engine inspection and allied subjects: write stating requirements. [1805

WIRELESS telegraphy.—Short courses for P.M.G. Certificate of Civil Aircraft. Full courses for marine certificate for youth 16 upwards; plenty of vacancies in both services for numbers in training.—Particulars from London Telegraph Training College, Ltd., 20, Penywern Rd., Earls Court, S.W.5 (Tel. Flaxman 8721), Est. 1896 [0299

AIRCREWS.—B.A.N.C.S. provide concise single lessons at 6/6 (ideal for all conversion courses), complete with illustrations, test paper and tutorial advice to the 1948 I.C.A.O. Navigator's and Transport Pilot's Licence standards; Supplementary Syllabus from Secretary, British Aeronautical Navigational Correspondence School, 143a, High St., Hythe, Kent. [0325

SOUTHEND-ON-SEA MUNICIPAL FLYING SCHOOL, Telephone Rochford 56204, no entrance fee, no subscription, Auster and Tiger Moth aircraft fitted with radio, dual from £2/15 per hour, solo from £2/10; night flying £4; courses for A and B licences, R/T licences, instructor's endorsement; restaurant and residential accommodation; fly with the school with V.H.F. radio and D/F facilities; only 39 miles from London with good bus and train services. [0332

BRITAIN'S AIR UNIVERSITY Navigation School Courses for the Flight Navigator's Licence and Commercial Pilot's Licence assemble on May 31st, August 30th, September 27th, October 25th, 1948. Training for Pilot's Instrument Rating, including Link Trainer instruction, and tuition in Schools of Flying, Radio and Radar, Aircraft and Radio engineering are also available.—Full details of all Courses from the Commandant, Air Service, Training, Hamble, Southampton. Tel. Hamble 2185. [0327

WANTED

FREIGHT contract wanted for Rapide; competitive prices on application.—Magic Carpets Ltd., 24a, Devizes Road, Salisbury. Tel. 3995. [1832

I—V.S. flameproof 10-12hp motor, speed range—infinitely variable between 1,500 and 3,000 r.p.m., suitable for 400 volts 3 phase 50 cycles supply, complete with suitable flameproof control gear.—Box 7665. [1838

SITUATIONS VACANT

Vacancies advertised are restricted to persons or employments excepted from the provisions of the Control of Engagement Order, 1947.

IMMEDIATE.

AIRCREW AND ENGINEERS.

WANTED.

FOR Engineers with A and C, preferably covering Lancastrians,
HALTONS, Merlins and Hercules.
TEN Engineers, preferably with Merlin and Hercules experience.
FOUR Engineers, preferably with Lancastrian and Halton experience.
THREE Electricians, preferably with Lancastrian and Halton experience.
TWO Instrument Mechanics, preferably with Lancastrian and Halton experience.
TWO Radio Maintenance Engineers.

EIGHT each Captains, First Officers and Radio Operators, pilots to have four-engine and navigation experience, preferably on Lancastrians and Haltons, and should hold B and 2nd N.

APPLY Grosvenor 4508,

OR full particulars in writing to ColCortone Holdings, Ltd.,
3, Seamore Place, Curzon St., London, W.1. [1849

GENERAL Secretary,

THE Society of Licensed Aircraft Engineers.

CONSEQUENT upon the coming resignation of the present General Secretary due to ill health, applications are invited for the post of General Secretary to the Society. Upon appointment, the successful applicant would be expected to undertake control of Head Office and instrument the fundamental policy of the Society under the direction of the General Council. Candidates should possess a sound general aviation background and experience of office administration.

APPLICATIONS should be received at Head Office,

THE Society of Licensed Aircraft Engineers,

FINSBURY Circus House,

BLOMFIELD Street,

LONDON, E.C.2.

MARKED for the attention of the Management Committee, no later than Saturday, 22nd May, 1948. [1824

PILOT light aircraft, B licence and instructors endorsement, with initiative and ability to organise charter work and instruction.—Box 7663. [1835

Aero & Jig & Tool Draughtsmen in Great Demand

MEN AND YOUTHS

There is an insatiable demand for Aero, Jig and Tools, etc., Draughtsmen and Inspectors. So acute is the present shortage that employers are only too anxious to engage those with no previous practical experience who are able to prepare neat and accurate drawings.

QUALIFY AT HOME—IN SPARE TIME

After brief, intensely interesting study—undertaken at home in your spare time—***YOU*** can secure an attractive and interesting post as **Aero-Draughtsman**. Numerous vacancies are also available in **Electrical, Mechanical, Plastics,** etc., branches of Draughtsmanship.

FREE GUIDE

The Free Guide contains 132 pages of information of the greatest importance to those seeking such success compelling qualifications as **A.M.I.Mech.E., A.F.R.Ae.S., A.M.I.P.E., A.M.I.E.E., Matric. and B.Sc.,** etc., also **R.A.F. Entry** (Maths., etc.), together with particulars of our remarkable Guarantee of

SUCCESS—OR NO FEE

Write now for your copy of this remarkable publication. It may well prove to be the turning point in your career.

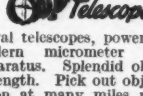
NATIONAL INSTITUTE OF ENGINEERING

(Dept. 427), 148-150, HOLBORN, E.C.1

(South Africa Branch E.C.S.A., P.O. Box 8417, Johannesburg.)

Genuine **BRITISH NAVAL** 35/- POST PACK ETC. PD.

Telescopic Gun Sight



Naval telescopes, powerful day and night lenses, modern micrometer automatic range focus apparatus. Splendid object lens. Approx. 15in. in length. Pick out objects with clarity and precision at many miles range. Made by famous instrument manufacturers. **35/- ONLY.** Post and Packing 1/6. Two or more carriage free.

EX ARMY BELL TENTS £8.15.0.

Centre pole, all accessories. Thoroughly reconditioned. Sleeps 8. Ht. 9ft. 6in., circ. 44ft. **£8/15/-** complete.

GENUINE EX-RAILWAY TARPAULINS. 70 sq. ft., **20/-,** 140 sq. ft., **£2/10/-,** 280 sq. ft. **£5.** Approx. 360 sq. ft., **£6**; approx. 720 sq. ft. **£12,** all incl. carr

MARQUEES—30 by 20ft., Ht. 14ft., **£38/15/-** complete. Larger Sizes, **Camping Equipment** in stock. Send 1d. for Bargain list.

MOST COMPACT BINOCULARS made. Weight 7 ozs. Crystal clear lenses. Ideal Holidays and sporting events. Price **50/-.** Post, etc., 1/-. W.D. model full size Binoculars complete case, leather slings, **£3/10/-,** post etc., 1/-. Special 6 lens Acromatic model, **£5/19/6,** complete in case, etc. Post 1/-.

HEADQUARTER & GENERAL SUPPLIES Ltd. (FLT)
196-200 Coldharbour Lane,
(Loughborough Junction), **London, S.E.5.**

R.A.F. UNIFORMS

FOR OFFICERS AND W.O.s
— NEW AND RE-CONDITIONED —
HUGE SELECTION IN STOCK

FISHERS, 88/88 **Wellington Street,** Woolwich, S.E.18 'Phone: 1055

SITUATIONS VACANT

DE Havilland Propellers Ltd.,

INVITE applications for the following vacancies:—

DRAUGHTSMAN

(A) Design and Detail to National Certificate Standard.
(B) Jig and Tool.
(C) Jig and Tool, experienced in die work.
(D) Design Test Equipment, general engineering experience.
(E) Knowledge of Ministry procedure.

WRITE, stating age, experience, and salary required, to Personnel Manager, de Havilland Propellers Ltd., Hatfield, Herts. [1826

THE de Havilland Aircraft Co., Ltd.

HAVE a few vacancies for men with aircraft design experience.
DESIGNERS capable of controlling design of major component structures.
DETAIL designers, mechanical and structures.

ELECTRICAL installation designers.

APPLICATIONS stating experience, age and salary required, to be marked "Aircraft" and addressed to Chief Draughtsman, The de Havilland Aircraft Co., Ltd., Hatfield, Herts. [1701

BODY makers, coach joiners, screen fitters, required immediately by
JAMES YOUNG, Ltd., Rolls-Royce and Bentley coachbuilders, London Rd., Bromley, Kent. Tel. Ravensbourne 3434. [0322

BRITISH SOUTH AMERICAN AIRWAYS CORPORATION have vacancies for flight operations officers.

NECESSARY qualifications: Flying experience as aircrew member, wide practical knowledge of flying control procedure, radio aids, meteorology, navigation, flight planning, and air legislation, and medical fitness for any climate; age under 40.
APPLICANTS possessing a civil air navigator's licence will be given preference.
SALARY according to qualifications, with overseas allowances where applicable.
APPLY in writing to: Personnel Officer, B.S.A.A. Corpn., Starways House, King St., St. James's, S.W.1.
ONLY those candidates required for interview will be advised. [1840

HORNTON AIRWAYS, Ltd., require an "A" and "C" licensed engineer for Dakota type aircraft, and preferably with an "O" endorsement.—Box 7517. [1800

WANTED.—Design and detail draughtsmen, preferably with experience in gas turbine and/or reciprocating engines.—Box 7416. [0400

SHORT BROTHERS & HARLAND, Ltd. have vacancies for Stressmen and Aircraft Weight Estimators, preferably with experience, in their technical department.
APPLICATIONS should be sent to the Chief Personnel Officer, Short Brothers & Harland, Ltd., Seaplane Works, Rochester. [1653

AIRCRAFT engineer required for progressive charter company; must hold A and C licences valid for Rapide, Consul and Auster.—Write, stating age, experience, etc., to Box 7664. [1837

JIG and tool draughtsmen; senior jig and tool draughtsmen with sheet metal, planning and tooling experience, and two experienced jig and tool draughtsmen required.—Box 7415. [0404

SAUNDERS ROE Limited, have vacancies for senior design draughtsmen, stressmen and aerodynamicists. Applications stating age, qualifications, experience and salary expected should be sent to Personnel Officer, Saunders Roe, Limited, East Cowes, Isle of Wight. [0394

CHIEF jig and tool draughtsman required for large aircraft concern; all-round experience in aircraft production tooling, including heavy aircraft structural jig design, machine tool design, etc.; experience in mass production press tools an advantage; good organising ability.—Reply with full details to Box 7419 [1777

SENIOR stressman and aerodynamicists required, having initiative and enterprise, to work on interesting new projects; high-speed wind tunnel and airworthiness checking; applicants should have good technical training and previous experience.—Apply in writing to Employment Manager, Vickers-Armstrongs, Ltd., Weybridge. [1821

ESTIMATOR fully conversant with estimating and ratefixing for small mass produced electrical components and equipment required by large manufacturer in the East London area; suitable applicants should have experience of electrical assembly and panel wiring and should be capable of competitive estimating; state age, experience and salary required to Box 7724. [1842

APPLICATIONS are invited from technicians, stressmen and aerodynamicists of degree standard, and design-draughtsmen with previous aircraft experience, for a few vacancies on the technical staff of Handley Page, Ltd. Extensive and interesting development programme in hand, offering good opportunities and prospects to candidates with initiative and enthusiasm.
APPLICATIONS, giving age, qualifications, experience and salary required, should be addressed to Staff Officer, Handley Page, Ltd., Claremont Rd., Cricklewood, N.W.2. [1663

CHIEF engineer required by established aircraft manufacturing company to take responsibility for the administration of the design and development departments; applicants must be first-class organisers and possess highest technical ability, together with a sound practical and academic aircraft engineering background; salary in the region of £2,000 per annum according to experience and qualifications; full details of past experience must be submitted which will be treated in the strictest confidence.—Box 7723. [1841

ROLLASON'S of CROYDON

(W. A. ROLLASON LIMITED)

CROYDON AIRPORT. Tel. CRO 5151/2.
(also at Southampton Airport. Tel. Eastleigh 87236/7; and Terminal House, Victoria, London, S.W.1. Tel. SLO 0611/20)

CHARTER AIRCRAFT :—RAPIDES, fitted Gipsy Queen III engines, very low engine and airframe hours, completely overhauled with 12 months C. of A. **STANDARD STR 16/17** Radio fitted, cabin furnishings and colour scheme to suit purchaser. Several for early delivery.

ANSONS, fully converted and modified to date, luxurious cabin furnishings, luggage compt., etc., fitted Radio-Payload 1,700 lbs., for immediate delivery.

CONSULS, PROCTORS, TIGER MOTHS, MOTH MINORS, GEMINIS, AUSTERS, SEABEES, etc., for immediate delivery at competitive prices. **ENGINES :—**Large quantity of Gipsy VI, Queens & Majors, Cheetah IX & X ready for immediate installation.

RADIOS :—MARCONI and **STANDARD RADIOS** in stock, very early delivery of new **STR 16/17** Radio modified to fit Rapides. Special terms to operating Companies.

SITUATIONS VACANT

DOWTY EQUIPMENT, Ltd., Cheltenham, Aircraft Hydraulic Engineers, require a senior mechanical or structural draughtsman and a junior draughtsman for test rig design.—Write Personnel Manager, Arle Court, Cheltenham. [1758

VIKING Captain required, minimum qualifications 2,500 hours, 250 hours in command of Viking aircraft, knowledge of African routes an asset.—Write, giving full particulars, to Air Superintendent, Hunting Air Travel, Croydon Airport. [1852

SITUATIONS VACANT

SENIOR stressman required.—Please send details of training, experience and salary required to Chief Technician, Gloster Aircraft Co., Ltd., Witcombe Glos. [0369

SITUATIONS WANTED

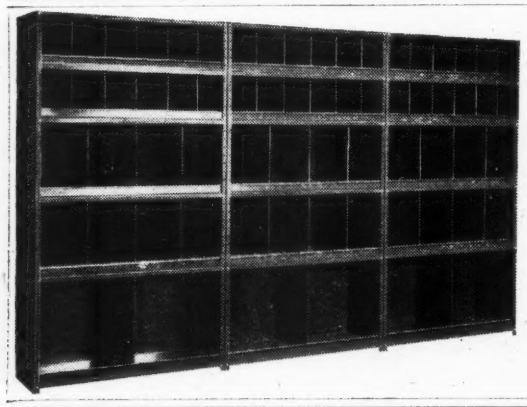
AERONAUTICAL Engineer (B.Sc., A.F.R.Ae.S., etc.) desires post as Technical Representative in France or Belgium; intimate knowledge of and very good connections in latter country; fluent French.—Box 7765. [1851

SITUATIONS WANTED

RADIO Officer, 27, single, P.M.G air, ex-R.A.F., desires flying position home or abroad; British airline experience.—Box 7642. [1833

PILOT-ENGINEER, age 26, 2,000 hours mainly singles, B.Sc. (Eng.); any situation requiring initiative and responsibility.—Box 7725. [1843

GENERAL Manager, A.M.I.P.E., experienced in factory organization, layout and planning, desires appointment in London area as Manager or Production Engineer.—Box 7641. [1831

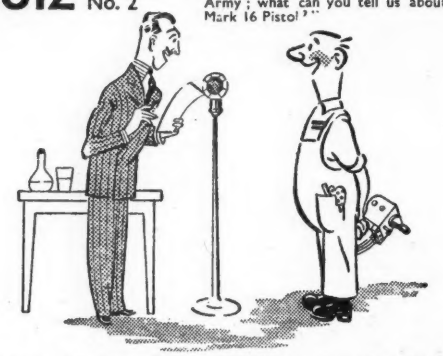


ARE YOUR STORES
ORGANISED FOR
TOTAL PRODUCTION
NOT IF YOUR EQUIPMENT
IS OUT OF DATE
FOR BINS, TOOL CABINETS, LOCKERS,
WORK BENCHES, ETC. *Prompt Deliveries.*

STONEHOUSE STEEL EQUIPMENTS
Phone: 0405/6/7 WEST BROMWICH Grams: "Steel," W.B.

QUIZ No. 2

"Now, Mr. Sprayitt. You've been in the Army; what can you tell us about the Mark 16 Pistol?"

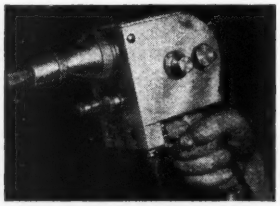


"What's the Army got to do with the Mark 16?" asked Tom Sprayitt, with a chuckle. "Army weapons are for 'knocking down' —Mark 16 is for 'building up'." To everyone's amazement Mr. Sprayitt produced the pistol itself from behind his back. "Straight off the job," he explained. "Been building up worn gear-box shafts all morning."

"It must be very tricky to operate," remarked the Quiz Master. Mr. Sprayitt shook his head. "Pull the trigger and direct the nozzle. No trouble at all and it's beautifully balanced."

"Amazing," said the Quiz Master.

"It is that," agreed Tom. "And while I'm at it this microphone stand could do with a bit of repair work." And before anyone could stop him, Mr. Sprayitt had the stand in his grasp and had marched off in the direction of Pear Tree Lane. Write to Metallisation Limited for booklets and information.



NO 'GONGS' FOR Metallisation

Contracting: Pear Tree Lane, Dudley. Metal Spraying Plants: Sales Office, Barclays Bank Chambers, Dudley

H-W.68

Brand New K20
FOLMER-GRAFLEX
Hand-Held, Manually-Operated
AIR CAMERA 5" × 4"

FEATURES:

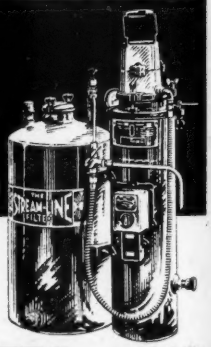
6¾ in. Kodak or Ilex f 4.5 anastigmat.
Iris Diaphragm, f 4.5 to f 22.
Variable Speed Shutter, 1/125 to 1/500.
Vacuum Pressure Plate (Synchronised).
Automatic Film-wind and Set Shutter.
50 EXP. DAYLIGHT LOADING FILM.
Data Recording on Negative.
Large Optical Parallax Finder.
Finger Grip Release.

and many other features. Supplied complete in fitted fibre case with red & yellow filters, accessories and manual. Price **£20.** (Cost £90). (Used model **£15**).
IDEAL FOR AIR OR SPORTS USE
(Govt. Surplus)

F. E. JONES 3 BREEZE HILL LIVERPOOL, 9 Tel.: AINTREE 1129

FILM FOR ALL PURCHASERS

Reduce Transport Costs



Lower costs for oil — lower charges for maintenance — longer periods between overhauls all result from the regular cleaning of oil by the Stream-Line Filter. It pays for itself in a few months.

STREAM-LINE FILTERS LTD TELEPHONE: MACAULAY 1011
HELE-SHAW WORKS · INGATE PLACE · LONDON · S.W.8

Printed in Great Britain for the Proprietors, FLIGHT PUBLISHING COMPANY LIMITED, Dorset House, Stamford Street, London, S.E.1, by THE CORNWALL PRESS LTD., 1-6, Paris Garden, London, S.E.1. "Flight" can be obtained abroad from the following: AUSTRALIA and NEW ZEALAND: Gordon & Gotch Ltd. INDIA: A. H. Wheeler & Co. CANADA: Imperial News Co., Gordon & Gotch, Ltd. SOUTH AFRICA: Central News Agency, Ltd., Wm. Dawson & Sons (S.A.), Ltd. UNITED STATES: The International News Co. Entered as Second Class at the New York, U.S.A., Post Office.

Because they pack more load into a restricted space

We should not like to give the impression that designers turn to Timken bearings only when they are up against dimensional difficulties—it is obvious from their extensive use that the bearings owe their success to a widespread combination of advantages.

Nevertheless, there are many applications where the concentrated load capacity of the bearing has saved the situation. Particularly is this true of special machines evolved for war purposes, where higher speeds —or pressures—or both, have led to bearing loads far beyond the original intentions, and with no hope of carrying them by the original bearings.

Then, though hemmed in by unalterable surroundings, a Timken bearing has been 'squeezed into' the space and has met the load out of its own generous reserve of capacity.

Registered Trade Mark: Timken.

TIMKEN

tapered roller bearings

BRITISH TIMKEN LTD., BIRMINGHAM, AND DUSTON, NORTHAMPTON

Telephone: East 1321. Telegrams: Britimken, Birmingham.
Associated Company: Fischer Bearings Co., Ltd., Wolverhampton, makers of FBC ball and roller bearings and transmission equipment.

FLIGHT

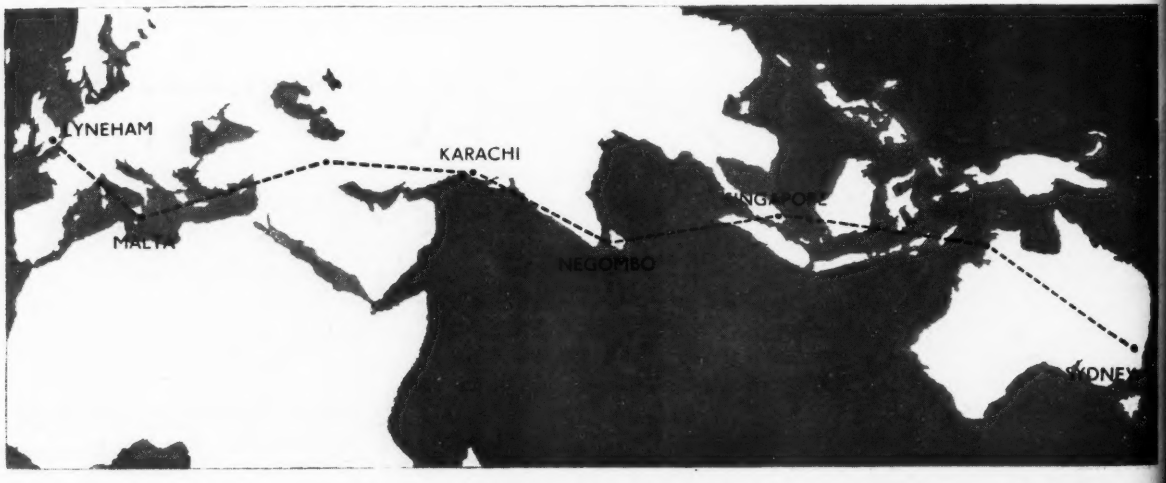
MAY 13TH 1948

797E

HASTINGS powered by HERCULES . . .

With its arrival at Sydney for the commencement of a demonstration tour of Australia, the new Handley-Page Hastings military transport successfully completed the 13,000 mile trip from Britain to Australia in 49 hours flying time. Testimony to the efficiency of the four "Bristol" Hercules engines is given in an extract from the aircraft's log . . . "Engine cooling is excellent, as is fuel consumption. We were all amazed at the speed of the aircraft . . . average for the whole trip being about 250 m.p.h." Throughout the flight the Hercules-powered Hastings functioned perfectly, and an inspection on arrival at Sydney revealed no troubles.

13,000 miles in 49 hours flying time



THE BRISTOL AEROPLANE COMPANY LIMITED · ENGLAND